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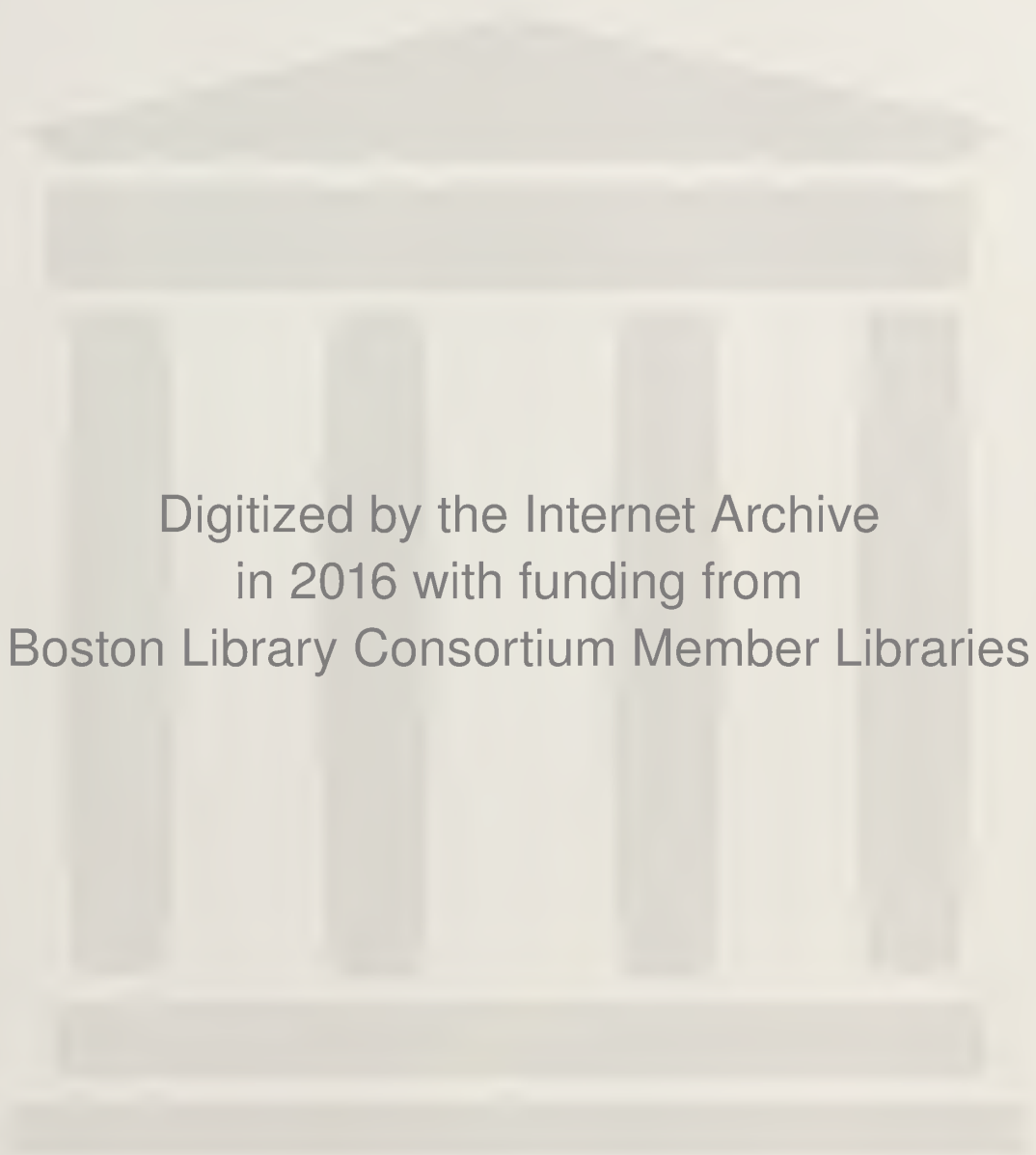
Late adolescents coping strategies and their physiological reactivity to romantic relationship conflict : self, partner, and couple effects.

Meredith L. Gunlicks
University of Massachusetts Amherst



LATE ADOLESCENTS COPING STRATEGIES AND THEIR PHYSIOLOGICAL REACTIVITY TO ROMANTIC RELATIONSHIP CONFLICT: SELF, PARTNER, AND COUPLE EFFECTS

A Dissertation Presented

by

MEREDITH L. GUNLICKS

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

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Psychology

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Approved as to style and content by:

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Sally I. Powers, Chair

_____

Aline G. Sayer, Member

_____

Jerrold S. Meyer, Member

_____

Genevieve E. Chandler, Member

_____

Melinda A. Novak, Department Head
Department of Psychology

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My utmost gratitude goes to Sally Powers, who provided invaluable insight and guidance through all stages of this dissertation. I have sincerely appreciated her enthusiasm and dedication, as well as all of the time and energy that she has devoted.

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ABSTRACT

LATE ADOLESCENTS COPING STRATEGIES AND THEIR PHYSIOLOGICAL REACTIVITY TO ROMANTIC RELATIONSHIP CONFLICT: SELF, PARTNER, AND COUPLE EFFECTS

SEPTEMBER 2006

MEREDITH L. GUNLICKS, B.A., WELLESLEY COLLEGE

M.S., UNIVERSITY OF MASSACHUSETTS AMHERST

PH.D., UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by: Professor Sally I. Powers

Both coping behaviors and physiological vulnerability to stress have been found to be associated with the development of psychopathology; however, less is known about the interrelations between coping and physiological stress responses. This study explored relations between late adolescents' styles of coping with distress and their physiological reactivity and recovery to negotiating conflict with their romantic partners. Partners' coping styles and the interaction between partners' coping styles were also examined as predictors of stress responses. One hundred and ninety couples were asked to discuss and attempt to resolve a conflictual issue that they had disagreed about in the previous month. Physiological reactivity was assessed using samples of salivary cortisol, a primary hormonal product of one of the major stress response systems. A salivary cortisol sample at entry, a pre-task anticipatory sample, and 5 post-task samples were collected. Growth modeling of the cortisol data indicated that dyadic coping was a better predictor of

cortisol reactivity and recovery during relationship conflict than individual coping behaviors alone. In addition, relations among coping and physiological stress responseswere found to be significantly different for males and females.

CONTENTS

LIST OF TABLES

Table

LIST OF FIGURES

Figure

CHAPTER 1

INTRODUCTION

It has now been well established that stressful events are strong predictors of the development of psychopathology. However, it has also been noted that many individuals who have experienced severe and/or chronic life stress proceed along fairly adaptive trajectories and do not develop psychological disorders (Bonanno, 2004; Egeland, Carlson, & Sroufe, 1993; Garmezy, Masten, & Tellegen, 1984). This has led to an increased interest in identifying who is at risk for developing emotional difficulties in the face of adversity and the processes through which individuals develop resiliency (Masten, 2001; Rutter, 1990). Some research has focused on innate physiological processes that might impact individuals' vulnerability to stress (Curtis & Cicchetti, 2003), while other research has focused on the behaviors or strategies that people use to attempt to cope with a difficult situation (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). Both have been found to be related to the development of psychopathology; however, less is known about the ways in which physiological stress responses and behavioral coping might interrelate.

Understanding the interplay between psychobiological processes and behavioral coping is important for two reasons. First, individuals' physiological experience of stress may influence the coping strategies that they choose to employ. Research has shown that an individual's physiological experience of stress is at least partially determined genetically (Bartels, de Geus, Kirschbaum, Sluyter, & Boomsma, 2003; Kirschbaum, Wüst, Faig, & Hellhammer, 1992). Individuals who are predisposed to experience heightened physiological arousal in response to stress may select coping strategies such

as avoidance or withdrawal that will help them to emotionally and physiologically disengage from the stressor (Powers, Pietromonaco, Gunlicks, & Sayer, 2006). These types of strategies may be effective for reducing physiological arousal, but they also have been shown to be related to emotional maladjustment (Felsten, 1998), and problematic interpersonal relations (Fincham, Beach, & Davila, 2004). Exploring links between physiological stress responses and coping strategies may help us to understand why some individuals choose to engage in coping behaviors that ultimately tend to have negative outcomes.

Second, while an individual s typical physiological stress response may impact his or her selection of coping strategies, the reverse is likely to be true, as well. The degree to which an individual displays a strong physiological response to stress may depend on how he or she emotionally and behaviorally responds, or copes, with the stressful event (Rutter, 1988). Adaptive coping strategies may reduce stress and thereby reduce physiological stress responses, while maladaptive coping strategies may leave stress unresolved and increase physiological reactivity (Gunnar, 1994). Focusing on the interrelations between coping behavior and stress responses may help to identify the processes through which individuals develop emotional difficulties or are able to be resilient in the face of adversity.

The physiological system investigated in this study is the hypothalamic-pituitary-adrenocortical (HPA) axis, a stress system that appears to play a central role in mediating the effects of stress on psychopathology (Stansbury & Gunnar, 1994). In conditions of stress, the HPA system secretes cortisol, an adrenocortical steroid hormone, as a means of mobilizing resources that are required to sustain the physical and psychological activity

needed for action. Once the stressor has abated. cortisol is responsible for negative feedback regulation of the HPA system. resulting in a decline in cortisol to normal levels. Healthy human functioning requires the ability to produce increased levels of cortisol in response to threat and to return the levels of cortisol to basal levels as soon as the threat has passed (Stansbury & Gunnar. 1994). While most individuals will mount a HPA stress response in the face of adversity and will recover afterwards. there is a great deal of heterogeneity in the timing and magnitude of individuals stress responses (Flinn & England. 1997: Granger et al.. 1998: Granger. Weisz. McCracken. Ikeda. & Douglas. 1996: Klimes-Dougan. Hastings. Granger. Usher. & Zahn-Waxler. 2001: Susman. Dorn. Inoff-Germain. Nottelmann. & Chrousos. 1997). Dysregulation of the HPA axis has been linked to the development of both depression and anxiety (Chrousos & Gold. 1992: Heim. Ehlert. & Hellhammer. 2000). which makes it a particularly relevant stress system for investigating associations between coping and physiological stress reactivity.

Until recently. the research literature on stress and coping has focused almost exclusively on the coping behaviors used by single individuals (Revenson. Kayser. & Bodenmann. 2005). However. it has been noted that coping is not necessarily an individual process. but rather. people cope within the context of relationships with others (Revenson. 2003). Stress impacts not only individuals. but the significant others in their lives. including romantic partners. Partners coping behaviors are likely to mutually influence each other. and the process and outcome of coping. as well as the stress experienced by each individual. is likely to depend on the interplay between each partner s coping behaviors and the extent to which they are compatible (Revenson. Kayser et al.. 2005).

The current study expands our knowledge of the interrelations between physiological stress responses and coping behavior and extends this literature to couples by examining late adolescent romantic partners coping strategies and their HPA responses to a conflict negotiation task. Conflict negotiation is likely to be a particularly salient context for couples, which makes it a natural context in which to study couples coping and their physiological stress responses. In addition, the task of conflict negotiation is relevant for mental health. Interpersonal interactions play an important role in the development and course of psychopathology, particularly depression (Joiner & Coyne, 1999). Problematic interpersonal relationships are some of the most common stressors associated with depression (Gotlib & Hammen, 1992). Depression also has a number of interpersonal consequences including more negative interactions with friends and romantic partners, lower relationship satisfaction for both the depressed individual and his or her partner, and impaired social functioning (Gotlib & Hammen, 1992; Hammen, 2003). This paper examined relations between late adolescents HPA responses to relationship conflict and their own coping strategies, their partners coping strategies, and the interaction between partners coping strategies. In addition, gender was examined as a moderator of these relations.

Individual Coping Behavior

Lazarus and Launier (1978) describe coping as efforts, both action-oriented and intrapsychic to manage (i.e., master, tolerate, reduce, minimize) environmental and internal demands, and conflicts among them, which tax or exceed a person s resources (p. 311). Coping behavior has been conceptualized and assessed in innumerable ways and there has been a great deal of controversy in the field as to what the core dimensions

or categories of coping are (Compas et al., 2001). Several studies using confirmatory factor analysis have identified two main types of coping which have been labeled engagement coping and disengagement coping (Compas et al., 2001; Skinner, Edge, Altman, & Sherwood, 2003). Engagement coping has been broken down further into primary control coping strategies and secondary control coping strategies. Primary control coping involves attempts to actively address the stressor by modifying the problem through problem-solving and behavioral action, and/or by identifying, understanding, and expressing the emotions associated with the stressful event (Connor-Smith, Compas, Thomsen, Wadsworth, & Saltzman, 2000; Weisz, McCabe, & Dennig, 1994). These are behaviors that may be enacted individually or with the support of others. Secondary control coping involves attempts to adapt to the stressful conditions by using strategies such as distraction, acceptance, and positive reframing (Connor-Smith et al., 2000; Weisz et al., 1994). Both types of engagement coping have been found to be predictive of emotional well-being (Connor-Smith et al., 2000; Stanton, Danoff-Burg, Cameron, & Ellis, 1994; Wadsworth & Compas, 2002; Whatley, Foreman, & Richards, 1998).

Disengagement coping involves moving away from a distressing event and the negative emotions it elicits by using behaviors such as withdrawal, denial, or behavioral or emotional disengagement (Compas et al., 2001). Results regarding the outcomes of individuals using disengagement coping have been mixed. Adolescents' use of avoidance coping has been found to predict engagement in risky behavior including delinquent behavior, substance use, sexual behavior, and educational underachievement (Cooper, Wood, Orcutt, & Albino, 2003), and it has been found to be positively

correlated with depression and anxiety (Felsten, 1998). However, Gottman and Levenson (1988) have argued that for men, contexts of interpersonal stress, such as conflict with a romantic partner, may demand avoidant coping strategies because men experience greater physiological arousal during conflict than women and take longer to recover afterwards. If men experience more stress from marital conflict, then men s avoidance or withdrawal may be a protective mechanism. In partial support of this theory, Blalock (2000) found that while avoidant coping predicted increases in depression and anxiety in women, it was unrelated to these symptoms in men.

In addition to engagement and disengagement coping, I explore in this study a coping strategy identified by Nolen-Hoeskema (1987), which she terms rumination. Rumination involves repetitively focusing on one s negative emotions in a passive way. It has been found to predict the onset of major depression, an increase in depressive symptoms, and an increase in the duration of a depressive episode (Nolen-Hoeksema, 2000). In addition, women have been found to be more likely to engage in ruminative coping and rumination has been found to mediate the gender difference in depressive symptoms (Nolen-Hoeksema & Jackson, 2001; Nolen-Hoeksema, Larson, & Grayson, 1999).

Research examining the link between coping strategies and HPA reactivity has focused on exploring the relationship between coping and HPA reactivity to the stress of taking an exam or giving a speech. In these contexts, using emotion-focused coping strategies including relaxation, self-soothing, and reframing a problem in a more positive manner, or task-oriented coping strategies, such as increasing effort, thinking about the exam, and seeking assistance predicted lower cortisol levels in response to the stressor

(Spangler, Pekrun, Kramer, & Hofmann, 2002). Rumination has been found to be associated with higher levels of cortisol secretion in response to a written examination (Roger & Najarian, 1998), though it was not found to be predictive of cortisol secretion in response to a mock job interview (Young & Nolen-Hoeksema, 2001).

Little is known about how these coping strategies are related to HPA reactivity to situations of interpersonal stress, such as conflict negotiation. Research examining other physiological responses to marital conflict, such as heart rate, blood pressure, general somatic activity, skin conductance level, and finger pulse amplitude, have found these physiological measures to be significantly related to conflict behaviors and relationship satisfaction (Ewart, Taylor, Kraemer, & Agras, 1991; Gottman & Levenson, 1992, 2002; Levenson & Gottman, 1983, 1985). In general, greater arousal has been associated with more negative interactions and lower relationship satisfaction.

Individuals behaviors during a conflict with a spouse have also been found to be related to changes in endocrine functioning (Kiecolt-Glaser et al., 1996; Malarkey, Kiecolt-Glaser, Pearl, & Glaser, 1994). Specifically, wives who used higher levels of positive interpersonal behaviors such as agreeing, approving, and accepting responsibility, displayed lower levels of epinephrine, growth hormone, and prolactin, and husbands who used higher levels of positive behaviors displayed lower levels of ACTH (Kiecolt-Glaser et al., 1996). ACTH is one of the hormones responsible for stimulating cortisol secretion (Breier et al., 1987), which suggests that interpersonal coping behaviors are likely to be related to levels of cortisol, as well. Kiecolt-Glaser et al. (1996) did examine relations among conflict behaviors and cortisol levels and found that wives and

husbands own behaviors were not related to their cortisol levels. Instead, they found that for cortisol, it was important to examine the interpersonal behaviors of both members of the couple in tandem.

Partners Coping Behavior

The attachment literature has suggested that when faced with a stressful situation, both children and adults tend to turn to an attachment figure (e.g. a parent or a romantic partner) to seek support (Simpson & Rholes, 1994). How the partner responds is likely to depend on the partner s own ways of coping. A partner who copes through avoidance, for example, may respond to the request for support by attempting to change the couple s focus to a more pleasant topic or activity. In contrast, a partner who uses active coping may respond by attempting to help solve the problem causing the distress. Partners coping behaviors could potentially provide a sense of security for the distressed individual, or they could heighten physiological stress, depending on the behavior and the extent to which it matches the individual s needs (Carnelley, Pietromonaco, & Jaffe, 1996; Simpson, Rholes, & Nelligan, 1992). For example, in a previous paper, we found that romantic partners avoidant attachment predicted elevated cortisol responses in response to conflict for male adolescents (Powers et al., 2006).

Dyadic Coping Behavior

As noted earlier, to achieve a better understanding of how coping occurs in the real world, it is critical to conceptualize coping as a process that occurs within the context of close relationships. John Gottman and his colleagues have conducted extensive research on the interactional patterns of married couples and have identified a number of types of couples based on their styles of interaction that predict marital satisfaction and

divorce (Gottman, 1979; Gottman, 1993, 1994; Gottman, Coan, Carrere, & Swanson, 1998). Couples who engage in interactions in which each partner responds to the other s negativity with increased negativity (i.e. both partners have similarly maladaptive coping behaviors) are the most likely to divorce. Also predictive of divorce is a mismatch between partners behavioral styles. These asymmetrical couples include a partner who engages in positive conflict behaviors and a partner who engages in negative conflict behaviors. Subsequent studies have also identified these asymmetric couples and have found that their marriages tend to be more troubled (Johnson & Bradbury, 1999; Schaap, 1982).

Gottman has also identified three types of happy couples which he has labeled as validators, volatiles, and avoiders (Gottman, 1993, 1994). Validators calmly discuss their problems and validate their spouse s feelings and opinions. Volitiles have more heated and conflictual interactions, but they are not characterized by criticism or contempt and the negative emotions are counterbalanced by displays of warmth and affection. Avoiders tend to minimize their problems and avoid conflict. If both members of the couple display the same type of behavior (e.g. they re both validators), they tend to report high levels of marital satisfaction and they are unlikely to divorce. However, if each partner displays one of these positive conflict styles, but the conflict styles are not complementary (e.g. one partner is a volatile and the other is an avoider), the couple tends to report lower levels of marital satisfaction.

To my knowledge, only two papers have examined the interaction between couples interpersonal coping behaviors and their HPA reactivity. Kiecolt-Glaser and her colleagues have found that among newlywed couples engaging in conflictual discussions,

wives displayed higher levels of cortisol when their husbands withdrew during the conflict in response to their wives demanding behavior (Kiecolt-Glaser et al., 1996). Fehm-Wolfsdorf, Groth, Kaiser, & Hahlweg (1999) coded the behaviors of married couples engaging in conflict and sorted them into three groups: both partners displaying predominantly negative behavior, both partners displaying predominantly positive behavior, and couples displaying asymmetric behavior. They found that the positive and asymmetric couples displayed the greatest cortisol reactivity to the conflict discussion, whereas the negative couples, who were likely to be using maladaptive coping strategies, showed a nonresponse to the conflict. At first glance, Fehm-Wolfsdorf s results seem to be in the opposite direction as would have been predicted based on studies examining other measures of physiological reactivity. However, cortisol responses are complex and it is not uncommon to sometimes see heightened physiological reactivity to stress and at other times to see suppressed reactions. One possible explanation for this is that studies are assessing cortisol at different stages of physiological adjustment to stress. It is typical to observe heightened cortisol reactivity in the short-term to an acute stressor (Stansbury & Gunnar, 1994). However, long term adjustment to chronic and/or traumatic stress, which may provoke frequent elevations of cortisol, appears to trigger down-regulation of the HPA system (Heim et al., 2000). This results in low rather than high levels of cortisol secretion in response to stress. It may be that the behaviors displayed by the negative couples in Fehm-Wolfsdorf et al. s (1999) study were frequently repeated responses to habitual conflict. If it is the case that marital conflict is a chronic stressor for these couples, it would be expected that they show suppressed reactions to marital stress, and it may explain why they showed a nonresponse to the conflict task.

The Importance of Studying Change in Cortisol over Time

Change in cortisol levels within an individual when faced with a stressful situation is a more sensitive measure of the HPA stress response than mean circulating levels in blood or urine (Levine & Wiener, 1989). As noted earlier, well-functioning individuals will produce increased levels of cortisol in response to stress and return cortisol levels of baseline once the stressor is over (Stansbury & Gunnar, 1994). This means that what constitutes an adaptive level of cortisol depends on the stage of the stress response. A healthy HPA stress response would involve relatively low apprehensive stress because the individual would feel that he or she would be capable of negotiating the upcoming stressor, increasing levels of cortisol as the individual actively engages with the stressor, and a fairly rapid return of cortisol levels to normal once the stressor is over. Simply assessing mean circulating levels of cortisol overlooks the complexity in what represents an adaptive HPA response.

The majority of the research examining change in cortisol levels in response to stress has only assessed the first 10-15 minutes of the stress response, including the activation of the stress response and the initial processes involved in continuing or terminating the response. The more slowly developing effects of HPA activity, which may not occur until 20-30 minutes after the HPA system has been activated, have received less attention (Stansbury & Gunnar, 1994). This segment of the HPA response is particularly important because it indicates the rate and extent of physiological recovery. Impaired recovery may place an individual at heightened risk for health and mental health problems by maintaining exposure to high levels of circulating cortisol. The extent of recovery after a stress response can also influence the individual s risk for

HPA overload when exposed to future stressors. The processes involved in terminating a stress response, which include the negative feedback effects described earlier, also impact memory processes and the integration of new information (Stansbury & Gunnar, 1994). How an individual understands and remembers a stressful event may alter responses to arousing events on subsequent exposures. The current study extends the time period over which cortisol levels are measured, beginning a half an hour prior to the conflict negotiation task and continuing until an hour following the conflict. This permits the assessment of the entire trajectory of stress responses, including responses in anticipation of the stressful event, during the event, and recovery after the event.

Examining cortisol change across a stressful event may be particularly important when exploring the relationship between cortisol reactivity and coping, since coping may differentially predict cortisol levels depending on the stage of the HPA response. The HPA stress response is more strongly activated if an event is perceived as uncontrollable or as a social-evaluative threat (Dickerson & Kemeny, 2004). The degree to which an event is perceived as uncontrollable and the degree to which an individual will expect to be negatively evaluated will depend on the individual s assessment of the coping resources he or she has available to manage the stress (Stansbury & Gunnar, 1994). Individuals who believe they possess adequate strategies for coping with conflict may have lower cortisol levels just prior to engaging in a conflictual discussion with their partners, while those who are uncertain about how to control or influence a stressful event and their behavioral and emotional reactions to it are likely to have a larger physiological stress response (Gunnar, Marvinney, Isensee, & Fisch, 1989). The degree to which their coping strategies are adaptive, will also likely impact their stress reactivity

during the conflict and the rate at which they recover afterwards. This paper examined the degree to which the coping strategies adolescents use habitually predict the course of their HPA stress response to an acute interpersonal stressor.

Adolescence as a Critical Period

Research suggests that adolescence may be a critical developmental period in which to investigate coping and the HPA system s response to stress. Adolescence is characterized by a significant rise in the rates of depressive symptoms and diagnoses, such that by late adolescence, rates have reached the high levels found in adults (Hankin et al., 1998; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993). During adolescence, a gender switch in the prevalence of depression is also observed. By age 18, girls outnumber boys by at least two to one in the lifetime prevalence of depression (Hankin et al., 1998; Lewinsohn et al., 1993).

Stressful events that are at least partly associated with adolescents own behavior, such as family or peer conflict or other interpersonal problems, have been found to increase significantly during adolescence (Gest, Reed, & Masten, 1999), and these events have been found to be associated with increases in mental health problems (Pine, 2003). In addition, Walker, Sabuwalla, & Huot (2004) have recently suggested that a normative increase in physiological sensitivity to stress may also occur during adolescence. Cross-sectional studies of HPA functioning in normal youth have found an increase in cortisol levels during middle childhood and a marked increase in adolescence (Kiess et al., 1995; Lupien, King, Meaney, & McEwen, 2001; Weinstein, Diforio, Schiffman, Walker, & Bonsall, 1999). A longitudinal study of changes in cortisol during adolescence also found an increase in cortisol levels across a 2-year period (Walker, Walder, & Reynolds,

2001). This normative increase in cortisol production suggests that the HPA axis may be more sensitive to stressful events during adolescence. The combination of larger numbers of social stressors and increased sensitivity to stress has been provided as one possible explanation for the increase in incidence of mental health problems during adolescence (Walker et al., 2004). This points to the importance of studying HPA stress reactivity in adolescents, as it may help us to understand how and why the rates of emotional maladjustment increase during this stage of development.

The Current Study

The current study explored relations between late adolescents' usual strategies for coping with distress and their HPA reactivity to conflict negotiation with their romantic partners. Five coping strategies that are representative of the primary types of coping behavior were investigated: active coping (primary control coping), support from others (primary control coping), distraction (secondary control coping), disengagement coping, and rumination. The study also examined two moderators of the relation of coping to HPA reactivity: gender and partners' coping.

As noted earlier, healthy human functioning requires the ability to produce increased levels of cortisol in response to stress and to return the cortisol levels to basal levels once the stressor is over. Thus, it is assumed that a rise in cortisol indicates engagement with the stressor and is adaptive if it is accompanied by anticipatory stress that is not too high and if the individual experiences physiological recovery after the stressor is over. This led to the hypothesis that adolescents' use of active coping, support from others, and distraction would predict: (a) lower levels of cortisol before engaging in the discussion with their partners because they feel they have the necessary tools to

successfully negotiate an interpersonal dispute: (b) higher levels of cortisol during the conflict because they will actively engage in the discussion: and (c) complete HPA axis recovery within one hour after the conflict because their adaptive coping is successful in addressing the stressful situation and regulating their emotions. It was hypothesized that adolescents use of disengagement coping strategies would predict: (a) higher levels of cortisol before engaging in the conflict because the anticipation of having to engage in a conflict will be stressful for those who typically try to avoid conflict: (b) a blunted stress response during the conflict because adolescents who use these coping strategies would not actively engage in the conflict. and (c) less recovery after the conflict because adolescents would not have been able to successfully negotiate their dispute. Adolescents who reported high levels of rumination were expected to display higher levels of cortisol before. during. and after the conflict because their tendency to focus on their negative emotions would be likely to heighten their distress during the conflict and prevent them from fully recovering afterwards.

It was also hypothesized that the interaction between adolescents own coping and their partners coping would predict the course of adolescents stress responses. Based on the few studies of couples behaviors and their physiological stress responses. it was hypothesized that when both partners reported using high levels of adaptive coping strategies (active coping. support from others. and distraction) and low levels of maladaptive coping strategies (rumination and disengagement coping). they would experience lower anticipatory stress. mount a stress response during the conflict. and experience full physiological recovery. When both partners exhibited low levels of

adaptive coping strategies, high levels of maladaptive coping strategies, or incompatible coping strategies, they were expected to experience heightened anticipatory stress and to experience less recovery after the conflict.

CHAPTER 2

METHOD

Participants

Participants in this study were a part of a larger NIH grant-funded longitudinal study investigating a biopsychosocial model of factors hypothesized to contribute to the development of adolescent depression. Participants were 190 older adolescent heterosexual couples (total of 380 adolescents) who had been involved in a relationship for at least 2 months (modal length of relationship = 1-2 years). Three participants cortisol levels were higher than three standard deviations above the mean. These participants were removed from the analyses, as were their partners. This resulted in a sample size of 374 adolescents (187 couples). Adolescents ranged in age from 18 and 21, with a mean age of 19.2. The ethnicity of the sample was 4.3% Hispanic or Latino, 0.3% American Indian, 5.3% Asian American, 1.3% African American, 86.4% European American, and 2.4% other. Participants were recruited from the western Massachusetts area through flyers, posters, and presentations in University of Massachusetts undergraduate courses. Each participant received $80 for completion of the study. University students enrolled in psychology courses also received extra credit points, if desired.

Procedure

During data collection at our university laboratory, each adolescent completed a series of questionnaires, participated in a discussion with his or her romantic partner that required negotiating an area of conflict, and provided seven saliva samples. Because cortisol levels follow a circadian rhythm, participants were invited into the lab at 4pm,

the time of day that cortisol levels are most stable (Kirschbaum & Hellhammer, 1989). Assessing stress-related changes in cortisol at time when cortisol levels are at their most stable decreases the amount of noise in the data. In addition, because cortisol levels are at their lowest towards the end of the day, assessing adolescents' cortisol levels in the late afternoon increased the possibility that any changes in cortisol levels due to the experimental interpersonal stressor would appear in the data.

Each partner was asked to identify a topic that had been a source of heated and unresolved discussions in the past month. Common topics identified by partners included disagreements about amount of time spent together, differences in level of commitment, dissatisfaction with the other partner's behavior (e.g. alcohol consumption, style of dress, punctuality), differences in beliefs (e.g. religion, political views), and jealousy/concerns about cheating. A researcher randomly selected one of the topics by flipping a coin, and the dyad was asked to spend 15 minutes describing the issue and attempting to come to some sort of resolution to the problem. Each discussion was videotaped without the presence of a researcher in the room.

Measures

Assessment of HPA Stress Response

To measure adolescents' HPA reactivity to the conflict negotiation task, seven salivary cortisol samples were collected over the course of the session. The first sample was collected at the beginning of the session. Cortisol takes about 20 minutes to travel from the adrenal cortex to saliva (Kirschbaum & Hellhammer, 1994). Consequently, the first sample assesses participants' stress hormone levels about 15 minutes prior to entering the laboratory. This sample measures participants' stress response to the general

task of participating in a psychological study, but not the specific task of negotiating conflict with their romantic partners. The second sample was specifically designed to assess stress reactivity in response to explicit anticipation of conflict negotiation with a romantic partner. The second sample was collected 15 minutes following a detailed description of the conflict negotiation task that noted that the discussion might take the form of an argument. Five post-task samples were collected 10, 20, 30, 45 and 60 minutes after the interaction task. In a prior paper, we reported that despite the potential for increased cortisol reactivity to the act of entering the laboratory, there was a significant change in cortisol levels when adolescents were in the conflict discussion (Powers et al., 2006). The decision to collect the final cortisol sample 60 minutes after the conflict discussion was made based on consultation with an expert in assessment of HPA reactivity (Douglas Granger, Director of Salimetrics, Pennsylvania State University). Preliminary analyses have shown that 60 minutes is a sufficient amount of time to allow physiological recovery and subsequent published studies have supported this as an adequate time for recovery (Kemeny, 2003). All samples were assayed for salivary cortisol in duplicate using a highly sensitive enzyme immunoassay (Salimetrics, PA). The test used 25 µl of saliva (for singlet determinations), and it had a lower limit of sensitivity of .003 µg/dl, range of sensitivity from .003 to 1.2 µg/dl, and average intra- and inter-assay coefficients of variation of 4.13% and 8.89% respectively. Method accuracy of cortisol assays from saliva is typically assessed through tests of spike recovery and linearity. Spike recovery tests whether a known amount of cortisol is measured accurately by the assay method when the known amount is inserted into an existing sample. The acceptable range for spike recovery is 80% to 120%. Linearity

signifies method accuracy when testing serial dilutions of samples with known amounts of cortisol. Perfect linearity would be 100%. The spike recovery for our sample was 105% and linearity was 95%.

HPA functioning has been found in previous studies to be affected by medications, including psychotropic medications (Bhagwager, Hafizi, & Cowen, 2002; Kojima et al., 2003; Meltzer, Bastani, Jayathilake, & Maes, 1997; Sagud et al., 2002), allergy medications (Wilson, McFarlane, & Lipworth, 1998), oral contraceptives (Kirschbaum, Kudielka, Gaab, Schommer, & Hellhammer, 1999), other non-prescribed drugs, nicotine (Kirschbaum, Strasburger, & Langkrar, 1993), caffeine (Quinlan, Lane, & Aspinall, 1997), alcohol (King, Houle, de Wit, Holdstock, & Schuster, 2002), timing and amount of sleep (Federenko et al., 2004), recent meals (Markus, Panhuysen, Tuiten, & Koppeschaar, 2000), recent exercise, illness, phase of menstrual cycle (Kirschbaum et al., 1999), and blood contamination. The majority of these confounding variables were controlled through the design of the study. Participants were given written and phone instructions to refrain from drinking alcohol, using illegal drugs, or visiting the dentist within the 24 hours prior to coming to the laboratory for their session. They were also directed not to exercise, eat, drink (except water), smoke cigarettes, or brush their teeth up to two hours prior to participation. Upon arrival at the lab, if participants had an elevated temperature, felt ill, or stated that they had been unable to comply with the above restrictions, they were scheduled to return at a later date. In addition, participants rinsed their mouths thoroughly with water 10 minutes before giving the first saliva sample to minimize the potential for saliva contamination.

There were two variables that we could not control for by design: prescribed medication (psychotropic medication, allergy medication, birth control, etc.) and blood contamination. Information regarding use of medication was carefully collected during the study. Participants were given a list of 52 drugs and asked to indicate if they had taken any of the drugs in the past 24 hours. Three of the control variables, females having a cold, females antibiotic medication, and males allergy medication, were significantly associated with cortisol reactivity. These variables were statistically controlled in all of the analyses.

Blood can leak into saliva because of poor oral health, abrasive brushing, or injury. Although precautions against these were taken in screening participation in the study, each participant s first saliva sample was assayed for blood contamination by Salimetrics, LLC using an enzyme immunoassay kit for transferrin. Blood contamination was found to be significantly related to males and females cortisol levels and was statistically controlled in all analyses.

Assessment of Coping Behavior

Adolescents coping was assessed using the Response Styles Questionnaire (Nolen-Hoeksema & Morrow, 1991), the Brief COPE (Carver, 1997), and the Emotional Approach Coping Scale (Stanton, Kirk, Cameron, & Danoff-Burg, 2000). These questionnaires were administered after couples engaged in the conflict negotiation task.

The Response Styles Questionnaire (Nolen-Hoeksema & Morrow, 1991) is a 71-item questionnaire that assesses four types of coping behaviors: rumination, distraction, problem solving, and engagement in dangerous activities. Items are rated on a 4-point Likert scale ranging from 1 (almost never) to 4 (almost always). Nolen-Hoeksema &

Morrow (1991) report strong reliability for the rumination and distraction scales (Cronbach s alpha = .89 and .80 respectively). They recommend that the problem solving and dangerous activities scales not be used on their own because they found these scales to have low reliability (.68 and .44 respectively).

The Brief COPE (Carver, 1997) is a shortened version of the COPE (Carver, Scheier, & Weintraub, 1989), a questionnaire frequently used to measure adaptive and problematic coping behavior. The Brief COPE includes the following subscales (reliabilities were reported by Carver (1997): Active Coping (α = .68), Planning (α = .73), Positive Reframing (α = .64), Acceptance (α = .57), Humor (α = .73), Religion (α = .82), Using Emotional Support (α = .71), Using Instrumental Support (α = .64), Self-Distraction (α = .71), Denial (α = .54), Venting (α = .50), Substance Use (α = .90), Behavioral Disengagement (α = .65), and Self-Blame (α = .69). Each scale consists of two items that are rated on a 4-point Likert scale ranging from 0 (I usually don t do this at all) to 3 (I usually do this a lot).

The Emotional Approach Coping Scale (Stanton et al., 2000) assesses coping through emotional approach. Published and author-constructed items were selected to assess emotion-focused coping without including distress-laden items or emotional avoidance items. The measure consists of two scales of 4 items each: Emotional Processing and Emotional Expression. Items are rated on a 4-point Likert scale ranging from 0 (I usually don t do this at all) to 3 (I usually do this a lot). Stanton et al. (2000) report strong internal reliability for both scales (Emotional Processing = .72, Emotional Expression = .82).

Exploratory factor analysis. Constructs that are assessed by the scales of the three coping questionnaires overlap considerably. Therefore an exploratory factor analysis (EFA) of the 63 items from the three measures was performed using principal components extraction with varimax factor rotation. Varimax rotation assumes that the factors are orthogonal. Factor analyses were conducted for males and females separately. The scree plot for the females indicated five main factors, each with eigen values greater than one and explaining 44.70% of the variance in the coping measures (See Table 1). The five factors were labeled Active Coping, Support from Others, Rumination, Distraction, and Disengagement Coping. The scree plot for males indicated the same five factors and explained 41.81% of the variance (See Table 2). Active Coping measures adolescents attempts to actively address the stressor by modifying the problem through problem-solving and behavioral action, and/or by identifying, understanding, and expressing their emotions about the stressful event. This factor includes the Brief COPE s Active Coping, Planning, and Venting scales, and the EACS s Emotional Processing and Emotional Expression scales. Support from Others (The Brief COPE s Using Emotional Support and Using Instrumental Support scales) measures the extent to which adolescents rely on practical help and emotional support from others to help them cope with a stressful event. Rumination (RSQ s Rumination scale and the Brief COPE s Self-Blame scale) measures adolescents passive and repetitive thoughts about their depressed mood and the causes and consequences of their mood. Distraction (RSQ s Distraction scale) measures adolescents engagement in pleasurable activities to take their minds off of their distress. Finally, the Disengagement Coping scale (RSQ s Dangerous

Activities scale and the Brief COPE s Behavioral Disengagement. Denial[1]. and Substance Abuse scales) assesses adolescents attempts to distance themselves from their negative moods through behaviors that tend to have negative consequences.

Confirmatory factor analysis. To provide cross-validation of these results. three confirmatory factor models were estimated using LISREL 8.7 (Jöreskog & Sörbom. 2004) to measure the fit of the model derived from the exploratory factor analyses reported above. Means. standard deviations. and correlations among the 14 coping indicators can be found in Tables 3 and 4. Initially. the model was fit on females only. Model fit was assessed by using a number of goodness-of-fit indices. The chi-square is sensitive to sample size which often leads to significant chi-square statistics even when the model is a good fit to the data (Klein. 2005). Because of this. several other indices of fit were also used including the χ^2/df ratio. the root-mean-square error of approximation (RMSEA) with 90% confidence intervals (90% CI). the comparative fit index (CFI). and the standardized root-mean residual (SRMR). Klein (2005) recommends the following values for these goodness-of-fit indices: χ^2/df ratio = 2.00 3.00. RMSEA < .08. CFI > .90. and SRMR < .10.

Model 1 tested the 5-factor model derived from the females EFA and factors were allowed to correlate. As noted in Table 5. this model was not a good fit to the data. The indicators Substance Abuse and Dangerous Activities did not load highly on the Disengagement Coping factor and were removed from the model in Model 2. The $\Delta\chi^2$ statistic indicated that Model 2 was a significantly better fit than Model 1. The χ^2/df ratio. CFI. and SRMR indicated that Model 2 was an adequate fit: however. there was not

[1] Denial had a large kurtosis (kurtosis = 6.36). Because of this. the natural log of Denial was used to correct for the non-normal distribution. Denial s kurtosis after the natural log transformation was .96.

enough variance in Emotional Support and Behavioral Disengagement. In order to increase the variance, in Model 3, Emotional Support and Behavioral Disengagement were each represented by their two questionnaire items rather than by their scale scores. As seen in Table 5, Model 3 was a good fit to the data; however, LISREL's modification indices suggested that having Venting load on both Active Coping and Rumination would improve the fit of the model. This made sense theoretically since venting could be used both as a way to express one's feelings with the adaptive goal of understanding one's emotions, and it could be used as a way to repetitively express one's feelings of helplessness and the inevitableness of one's depressed mood. Venting was allowed to double load in Model 4. Goodness-of-fit indices suggested that Model 4 was a good fit to the data and a significantly better fit that Model 3. The final path diagram for females coping strategies is illustrated in Figure 1. As shown in Figure 1, many of the coping factors were significantly intercorrelated. The largest correlations were between Active Coping and Support from Others ($r = .51$) and between Rumination and Disengagement Coping ($r = .48$). Correlations between factors and their indicators were generally similar in size (e.g. factor loadings for Support from Others ranged from .81 to .92). Disengagement Coping had the greatest variability in factor loadings with correlations ranging from .53 to .81.

Once a coping model had been developed for the females, it was necessary to determine if the model was a good fit for males, as well. A multigroup CFA was conducted to compare the factor configurations of males and females including the number of factors, correlations among factors, and pattern of factor loadings (see Table 6). In the first unconstrained model, the factor configurations were allowed to differ

across groups. In the second model, factor intercorrelations were constrained to be equal to test for factor configuration invariance. In the third model, factor loadings were constrained to be equal to test for factor loading invariance. A chi-square difference test was used to determine whether constraining the factor configurations and factor loadings to be equal resulted in a significant decrement in model fit (Klein, 2005).

When the factor configurations were constrained in the second model, the difference in chi-square was significant, which suggested that the factor configurations for males and females were different. However, Byrne, Shavelson, and Muthén (1989) have indicated that total configuration invariance is often not feasible. Because constraining the factor configuration resulted in a chi-square difference score that was just barely significant, the factor configuration was judged to be an adequate fit for both males and females. Constraining the factor loadings in the third model resulted in a nonsignificant chi-square difference score, suggesting that the factor loadings were invariant for males and females. Figures 2 and 3 illustrate males' and females' path models for the final test of invariance.

To develop composite coping scores for each participant, each indicator was weighted equally by using unit weighting. This seemed reasonable given that correlations between each factor and its indicators were similar in size. Factor scores were created by averaging across the scores of each factor's indicators.

Analytic Strategy

Hierarchical Linear Modeling (HLM; Raudenbush & Bryk, 2002) was used to plot the trajectories of adolescents' stress responses, and to predict variance in these trajectories from adolescents' own coping styles and their partners' coping styles. HLM

creates growth curves for a dependent variable using multiple data points (in this case, cortisol levels over seven time points). An additional important advantage of HLM is that it is able to take into account the interdependent nature of data from couples.

The growth curve modeling specified two linked models. The level 1 model defined three coefficients that characterized participants' curvilinear stress trajectories. These coefficients were allowed to take on different values for each participant. The level 2 model included predictors to explain variance in these level 1 coefficients.

The Level I HLM Model

The level 1 model was represented by the following equation: $Y_{ij} = \beta_{f1j}(female\ intercept)_{ij} + \beta_{f2j}(female\ linear)_{ij} + \beta_{f3j}(female\ quadratic)_{ij} + \beta_{m4j}(male\ intercept)_{ij} + \beta_{m5j}(male\ linear)_{ij} + \beta_{m6j}(male\ quadratic)_{ij} + e_{ij}$. Y_{ij} is the cortisol score i for couple j, with $i = 1$ .28[2] data points and $j = 1$ .187 couples. For females, β_{f1j} is the model intercept. This represents the predicted value of the outcome when the origin of time is zero. Time was rescaled in the models so that the intercept represents the level of cortisol midway through the interaction task, as assessed by the third sample and called the discussion point (time zero). B_{f2j} is the linear rate of change, also called the instantaneous rate of change, in cortisol level at time zero. In polynomial functions that include both a linear and quadratic term, the tangent to the curve at any point is defined as the instantaneous rate, and indicates how fast the curve is changing at that point. This rate can be estimated at any point along the curve. In the present model, the instantaneous rate of change is estimated at the point at which time is centered, thus allowing for analysis of differences in change at the midpoint of the discussion. B_{f3j} is

[2] Each partner provided seven saliva samples. Each saliva sample was divided in half, resulting in 14 cortisol samples for each partner, and a total of 28 for the couple.

the rate of the rate of change in cortisol for the entire period of assessment (also called the quadratic effect or curvature of the growth trajectory). It indicates the extent of acceleration or deceleration in cortisol change across the entire trajectory. Finally, e is the error, which is assumed to have a mean of zero and a constant variance, σ^2. B_{m4j}, B_{m5j}, and B_{m6j} represent the same parameters for the males trajectories.

The Level 2 HLM Model

The level 2 model is represented by the following equations:

$$B_{f1j} = \gamma_{10} + \gamma_{11} + \gamma_{12} + \upsilon_{1j}$$

$$B_{f2j} = \gamma_{20} + \gamma_{21} + \gamma_{22} + \upsilon_{2j}$$

$$B_{f3j} = \gamma_{30} + \gamma_{31} + \gamma_{32} + \upsilon_{3j}$$

$$B_{f4j} = \gamma_{40} + \gamma_{41} + \gamma_{42} + \upsilon_{4j}$$

$$B_{f5j} = \gamma_{50} + \gamma_{51} + \gamma_{52} + \upsilon_{5j}$$

$$B_{f6j} = \gamma_{60} + \gamma_{61} + \gamma_{62} + \upsilon_{6}$$

In the level 2 model there is an equation for each level-1 coefficient. The outcome (the beta) is equal to an intercept, plus a predictor, plus a random effect, which represents the residual variance around the fitted model. The linked level 1 and level 2 HLM models present statistical tests of the association of coping styles to cortisol level at the discussion point, the association of coping styles to the rate of change in cortisol at the discussion point, and the association of coping styles to the curvature of the stress trajectory for cortisol across all seven time points.

CHAPTER 3

RESULTS

Preliminary Analyses

Table 7 presents males and females mean cortisol levels at the seven time points. Males and females mean coping scores are presented in Table 8. Females reported that they were significantly more likely to use active coping, support from others, rumination, and distraction than males. There were no gender differences for disengagement coping. Adolescents own coping styles were significantly intercorrelated; however, their coping styles were not significantly correlated with their partners self-reports of coping (See Table 9).

Growth Models of Cortisol Reactivity and Recovery

Before testing the hypothesis that adolescents coping strategies and their partners coping strategies would predict their stress reactivity and recovery, an unconditional HLM model was fit with no predictors at level 2 to determine if there was a substantial amount of variance across individuals in the coefficients that define the cortisol trajectories that was unexplained by the level 1 model, warranting an analysis of predictor variables. Significant individual variation was found in levels of cortisol at the intercept, rates of change in cortisol, and the curvature of the entire stress trajectory for both males and females. This significant variation meant that participants did not all respond to the conflict task in the same way and that it was useful to examine whether coping strategies might account for the variance among adolescents stress trajectories.

Do Adolescents Own Coping Styles Predict their Cortisol Reactivity and Recovery?

The HLM analyses were run first with only adolescents own coping behaviors as predictors. Only males HPA responses were predicted by their own coping. As seen in Table 10, males use of support from others significantly predicted their cortisol trajectories. Figure 4 illustrates this finding by presenting prototypical stress trajectories for males who score at the 75th percentile of the distribution in use of support from others and for males who score at the 25th percentile. Males who reported relying heavily on support from others displayed slightly lower cortisol levels prior to entering the laboratory, but they mounted a larger stress response during the conflict. After the conflict was over, their cortisol levels declined more rapidly, suggesting that they recovered from the conflict more quickly. The effect of using support from others on the curvature of the cortisol trajectory was significantly different for males vs. females ($\chi^2(1) = 6.53$, $p = .010$). Females own coping styles did not predict their stress reactivity or recovery (See Table 11).

Does Including Partners Coping Styles Add to the Prediction of Adolescents Cortisol Reactivity and Recovery?

The results for the full HLM model including adolescents own coping styles, their partners coping styles, and the interaction between each partner s coping styles are presented in Tables 12 and 13. This model was a significantly better fit to the data than the model that included only adolescents own coping behaviors ($\chi^2(57) = 84.31$, $p = .011$). Both males and females stress reactivity and recovery were predicted by their partners coping styles and the interaction between their own coping styles and their partners coping styles.

Using support from others. For males, their girlfriends' use of support predicted their levels of cortisol at the discussion point, and the interaction between males' own use of support and their girlfriends' use of support predicted their cortisol trajectory (see Table 12). Males displayed higher levels of cortisol during the discussion if their girlfriends' reported using high levels of support from others than if their girlfriends reported using low levels of support (See Figure 5). Figure 6 presents four prototypical stress trajectories to illustrate the different combinations of males' and females' high use of support and low use of support in predicting males' cortisol trajectories. These are fitted trajectories for individuals with specific combination of values on the predictor variables and illustrate the range of important effects in the data. The values chosen are the 25th and 75th percentile values of the support distribution for males and females. Most notably, when both members of the couple reported using low levels of social support, males experienced greater anticipatory stress and showed the least recovery after the conflict.

For females, their boyfriends' use of support from others predicted their cortisol trajectory, and the interaction between their own use of support and their boyfriends' use of support predicted their linear rate of change at the discussion point (see Table 13). As illustrated in Figure 7, females with boyfriends who reported using high levels of support (75th percentile) had lower levels of cortisol prior to engaging in the conflict, mounted a strong stress response during the conflict, and recovered afterwards. Females with boyfriends who reported using low levels of support (25th percentile) entered the study more physiologically aroused, mounted less of a stress response, and recovered less quickly. Figure 8 presents four prototypical stress trajectories to illustrate the different

combinations of males and females high use of support and low use of support. The values chosen are the 25th and 75th percentile values of the support distribution for males and females. Females recovered from the conflict the least quickly if both partners reported using high levels of support from others to cope with distress.

Rumination. For males, the interaction between their own rumination and their girlfriends rumination significantly predicted their levels of cortisol at the discussion point (see Table 12). As illustrated in Figure 9, males in couples in which both partners reported high levels of rumination had significantly higher levels of cortisol during the discussion than the other three groups.

Females cortisol trajectories were significantly related to the interaction between their own rumination and their boyfriends rumination (see Table 13). As illustrated in Figure 10, females displayed higher levels of cortisol upon beginning the study and recovered less quickly from the conflict if there was a mismatch between each partners use of rumination. Females who reported high levels of rumination and had boyfriends who reported low levels of rumination exhibited the highest levels of cortisol at the beginning of the study and showed the least recovery. Females displayed the lowest levels of cortisol at the beginning of the study and recovered the most quickly if both members of the couple reported high levels of rumination or if neither member of the couple was a ruminator.

Active coping. The linear rate of change in females cortisol at the discussion point was significantly predicted by the interaction between their own use of active coping and their boyfriends use of active coping (see Table 13). Females recovered from the conflict less quickly if they reported high use of active coping, but their boyfriends reported low use of active coping (see Figure 11).

CHAPTER 4

DISCUSSION

Both coping behaviors and physiological vulnerability to stress have been found to be associated with the development of psychopathology (Compas et al., 2001; Curtis & Cicchetti, 2003); however, less is known about the interrelations between coping and physiological stress responses. The findings of this study demonstrate that coping strategies of support from others, rumination, and active coping are significant predictors of individuals' physiological responses to interpersonal conflict. In addition, it is one of the first studies to demonstrate that dyadic coping is a better predictor of HPA reactivity and recovery during relationship conflict than individual coping behaviors alone. The results also suggest that gender plays a critical role in the relation of couples' coping to their physiological experiences of stress.

Partners' Coping Behavior

Both males and females displayed higher levels of cortisol during the discussion when their partners' reported using high levels of social support. That is, they experienced greater stress when their partners attempted to use them as a means of support during their conflict. As noted earlier, higher levels of cortisol during the conflict discussion may be adaptive, assuming anticipatory stress is low and recovery is quick, because mounting a stress response is likely to indicate engagement in the task. If an individual is demanding support and the partner mounts a strong stress response during the conflict, it may indicate that the partner is actively engaged in attempting to provide that support. Providing support does carry stress with it, and may come from the complex task of having to stand up for one's own point of view while simultaneously

attempting to be supportive of the partner. However, this may be an example of stress that is adaptive for a couple in the long run. The provision of social support is thought by some to be one of the most important aspects of couples' coping (Cutrona, Russel, & Gardner, 2005; Lyons, Mickelson, Sullivan, & Coyne, 1998). Receiving instrumental and emotional support, particularly from a romantic partner, has been shown to be related to higher relationship satisfaction (Julien & Markman, 1991), better mental health outcomes (Coyne & Downey, 1991), and better psychological adjustment to physical illness (Revenson, 1994). The present study's results suggest that while the provision of social support is related to a number of positive long-term outcomes for the individual who receives the support, there is a short-term cost for the partner who is providing it. In order to be able to sustain behaviors that may be the most beneficial for each partner and for the relationship, partners may have to be able to tolerate higher levels of temporary physiological arousal.

While females with boyfriends who reported using high levels of support displayed higher levels of cortisol during the discussion, they appeared to be significantly less stressed in anticipation of having the conflict, and they recovered from the conflict more quickly than females with boyfriends who reported using low levels of support. There has been some suggestion that women tend to be socialized into the caregiving role in intimate relationships (Christensen & Heavey, 1990; Gilligan, 1982; Heavey, Layne, & Christensen, 1993). Shelley and her colleagues have proposed that when females are faced with a stressful event, their response may be more likely to be a "tend-and-befriend" response rather than a "fight-or-flight" response (Taylor et al., 2000). When under stress, females may be more likely to engage in nurturing behaviors that reduce the

distress of those they care about and to focus on creating and maintaining close relationships that can provide a means of support. If it is the case that providing support to a loved one is an activity that is familiar and compelling for women, the knowledge that they are about to engage in a task in which their partners are likely to make use of them in this way may result in the experience of less anticipatory stress. These women also recovered from the conflict more quickly. It is possible that by being able to provide their partners with support and being able to tolerate the arousal associated with it, they may have been able to be more successful in resolving their disputes, resulting in a faster recovery after the conflict.

Dyadic Coping Behavior

It was hypothesized that adolescents' own coping would significantly interact with their partners' coping to predict their cortisol reactivity and recovery. Specifically, it was hypothesized that when both partners utilized compatible adaptive coping strategies, they would experience lower anticipatory stress, mount a stress response during the conflict, and recover more quickly. When partners exhibited similar maladaptive coping strategies or incompatible coping strategies, they were expected to experience heightened anticipatory stress and to experience less recovery after the conflict. The results of this study supported the hypothesis that dyadic coping behavior significantly predicts males' and females' cortisol reactivity and recovery; however, the results were more consistently in the hypothesized direction for males than for females.

Consistent with hypotheses, when males were in a relationship in which neither member of the couple sought support from one another, they demonstrated more physiological distress. Specifically, they experienced greater anticipatory stress and showed less recovery after the conflict. Lack of support may have made the notion of having a conflict more threatening. In addition, it may have impeded the couples ability to resolve the conflict and regulate the emotions that arose, resulting in males experiencing less physiological recovery after the conflict.

In contrast to males, females appeared to be most physiologically burdened if both partners reported using high levels of support. Some research has suggested that when under duress, females continue to care for their partners despite their difficulties, whereas males tend to focus more on themselves and less on providing support for their partners (Michela, 1987; Revenson, Abraido-Lanza, Majerovitz, & Jordan, 2005). It may be that when both members of the couple need a lot of support, males may have more difficulty providing the support that their girlfriends need. A study conducted by Kirschbaum, Klauer, Filipp, & Hellhammer (1995), which found that girlfriends displayed higher cortisol responses to a psychosocial stressor when their boyfriends attempted to provide them with support, substantiates this notion. If females are not receiving the kind of support that they need from their boyfriends, they may have more difficulty recovering from stressful situations, such as interpersonal conflict. Future research examining partners joint need for support, the kind of support that would be most effective, and their physiological reactivity with and without support during conflict would help to clarify this possibility.

Active Coping

The hypothesis that couples would experience greater apprehension and less recovery if there was a mismatch between partners coping strategies was supported for females and the couples use of active coping. Females who reported using high levels of active coping, but were partnered with a boyfriend who reported low use of active coping experienced less recovery following the conflict. This pattern is similar the demand-withdraw pattern observed during the marital conflicts of distressed couples in which females make demands of their male partners, while the male partners attempt to avoid or withdraw from the discussion (Christensen & Heavey, 1990; Heavey et al., 1993). If the boyfriends in the present study were not actively attempting to address the conflictual issue or the feelings associated with it, they may have impeded or even derailed their girlfriends attempts to engage in these behaviors. Not being able to engage in behaviors that they believe will help them to manage a stressful situation, and that actually may be effective in successfully and comfortably negotiating conflict, may have made it more difficult for the females to recover when the conflict task was over. Kiecolt-Glaser et al. (1996) reported similar results with married couples. In their study, wives displayed a stronger cortisol response to marital conflict when their husbands withdrew in response to their demands.

Rumination

It was expected that if both members of the couple reported high levels of rumination, they would display higher levels of cortisol before, during, and after the conflict because their collective tendency to focus on their negative emotions was expected to heighten their distress during the conflict and prevent them from fully

recovering afterwards. This hypothesis was supported for males, but not for females. Females cortisol was significantly predicted by the interaction between their own rumination and their boyfriends rumination; however, females appeared to experience greater physiological stress when there was a mismatch between their own use of rumination and their boyfriends use of rumination. When neither member of the couple reported high levels of rumination and when both members of the couple reported high levels of rumination, females experienced the least anticipatory stress and showed the greatest recovery. Presumably, when neither member of the couple ruminated, the lack of repetitive and passive focus on their difficulties resulted in less stress. What is interesting is that females were also less stressed if both members of the couple ruminated. A recent article identified a phenomenon called co-rumination in which dyads collaboratively engage in repetitive and mutually encouraged discussion of problems and the negative feelings associated with them (Rose, 2002). Female adolescents were found to engage in this type of behavior more often than males and while co-rumination was related to more emotional difficulties, it was also related to higher-quality close friendships (Rose, 2002). Self-disclosure has been found to be associated with more positive friendships characterized by heightened emotional closeness (Camarena, Sarigiani, & Peterson, 1990; Parker & Asher, 1993). While co-rumination may increase emotional distress, it appears that it may also serve as a mechanism to bring individuals closer together. It is possible that for the female ruminators in our study who were partnered with ruminating boyfriends, the intense focus on their problems and negative emotions led them to feel more positive about their

relationships, leading them to experience less physiological stress prior to the conflict and to recover more quickly afterwards. Future research is needed to examine the actual interpersonal behaviors exhibited by couples in which both partners ruminate.

Limitations

Several limitations to this study should be noted. First, this paper used a cross-sectional design to determine if individuals' and couples' coping strategies predicted their physiological stress responses to relationship conflict. It is likely, however, that relations between coping and stress reactivity and recovery are bi-directional. As noted earlier, physiological reactivity is at least partially determined genetically and the level of arousal that an individual tends to experience may drive the type of coping strategy that he or she chooses to employ. However, the reverse may also be true – the way in which one copes with distress may influence the degree of physiological stress that one experiences. Longitudinal designs would be ideal for disentangling the reciprocal relations between coping behavior and physiological stress responses.

This study found significant relations between adolescents' self-reports of general coping strategies used in most situations and their physiological reactivity to the specific task of conflict negotiation with a romantic partner. It is much more difficult to find significant associations this way than to examine coping behaviors used specifically during conflict negotiation. This makes the findings of this study particularly notable. However, it is possible that couples may employ unique coping strategies for negotiating relationship conflict that they do not generally use in other contexts. Future studies might

examine the specific coping behaviors used by couples during relationship conflict to determine the extent to which patterns are similar to those observed between general coping strategies and stress responses to conflict.

This study focused on young couples in dating relationships, and it is possible that the findings may not generalize to older couples in longer, more committed relationships. Couples in longer relationships will have stress reactions to conflict that are based on a long history of shared interaction patterns, and their coping behaviors may have become relatively more automatic over time. It is possible that this greater experience may reduce stress responses. However, it may also be that such routinized patterns require less input from a partner or situation to trigger a strong physiological reaction.

The participants in this study were also primarily European-American. It is possible that the relationship between coping and physiological stress responses to relationship conflict may be different in different racial and ethnic groups. Some studies have found racial and ethnic differences in coping behaviors (Chapman & Mullis, 2000; Copeland & Hess, 1995; Lam & Zane, 2004), including behaviors demonstrated during relationship conflict (Crohan, 1996). It is possible that racial and ethnic differences in preferred coping behaviors are related to differences in physiological experiences of these coping behaviors. Future studies with non-European American samples are needed to determine the extent to which associations between coping and physiological stress responses are similar across racial and ethnic groups.

Clinical Implications

The results of this study have a number of implications for clinical practice. Mental health workers often work from the theory that psychological problems develop as a result of deficits in coping skills (D'Zurilla & Nezu, 1982) or the rigid use of a coping strategy or defense in situations where the preferred coping strategy is not adaptive (Shapiro, 1965). Consequently, a patient's repertoire of coping strategies is often an area that is targeted in psychotherapy. Helping a patient learn and implement more adaptive coping strategies and extinguish maladaptive ones most typically occurs within the context of individual psychotherapy. However, the results of this study suggest that when a patient has a romantic partner who is also likely to be involved in the coping process, psychotherapy may be more effective if the patient's partner also participates in the therapy. This would allow the therapy to address the compatibility of each partner's usual coping styles and would facilitate the process of coping with stress as a couple.

The results also provide some guidance about specific therapeutic interventions that may be effective for couples coping with stress. First, it would be helpful to educate couples about adaptive versus maladaptive stress. Coping strategies that have been found to be the most beneficial for relationship functioning, such as the provision of social support and active engagement in problem-solving behavior, were associated with less anticipatory stress and greater recovery after the conflict, presumably because the coping behaviors facilitated resolution of the conflict. However, these behaviors also required couples to tolerate higher levels of physiological arousal during the conflict. It would be helpful to warn couples of the physiological arousal associated with providing support

and engaging in conflict with a romantic partner. By helping couples identify and label their physiological discomfort, they may be more likely to notice themselves becoming aroused and attempt to stay with the conflict rather than resorting to behaviors that would reduce physiological discomfort but be problematic for relationship functioning. Providing couples with relaxation training may also help them to manage their physiological arousal during conflict.

Second, the females in this study appeared to experience more stress when both partners reported relying heavily on social support. One interpretation of these findings is that when both members of the couple require a lot of support, males may have more difficulty providing the support that their girlfriends need. If this is the case, it would be helpful during therapy to ask females to describe to their partners what they perceive to be helpful support. Therapy could then focus on teaching male partners how to provide the kind of support that their female partners need.

Conclusion

This study demonstrates that dyadic coping is a better predictor of HPA reactivity and recovery during relationship conflict than individual coping behaviors alone. This clarifies the importance of conceptualizing coping as a process that occurs within the context of close relationships and indicates that dyadic coping is critical for understanding the stress associated with conflict. In addition, gender was found to play an important role in the relation of couples' coping to their physiological experiences of stress. Males and females may differ in terms of their needs during interpersonal disputes and the extent to which their own usual coping behaviors are beneficial for their partners, as well themselves.

Table 1

Female Coping Factor Loadings: Five Factor Solution

	Factor loadings				
	1	2	3	4	5
Factor 1: Active Coping					
I concentrate my efforts on doing something about the situation I m in. (COPE)	**.54**	.15	.00	.05	-.23
I take action to try to make the situation better. (COPE)	**.60**	.08	.04	.00	-.25
I try to come up with a strategy about what to do. (COPE)	**.50**	.14	-.01	.04	-.11
I think hard about what steps to take. (COPE)	**.53**	.13	.09	.24	-.19
I let my feelings come out freely. (EACS)	**.72**	.06	.02	.03	.01
I take the time to figure out what I m really feeling. (EACS)	**.43**	.14	.02	.23	-.26
I realize that my feelings are valid and important. (EACS)	**.64**	.10	-.10	.04	-.09
I take the time to express my emotions. (EACS)	**.85**	-.08	-.03	-.04	-.06
I acknowledge my emotions. (EACS)	**.76**	.13	-.03	.12	-.02
I allow myself to express my emotions. (EACS)	**.83**	.02	-.03	.04	.01
I delve into my feelings to get a thorough understanding of them. (EACS)	**.66**	.12	.11	-.01	-.10
I feel free to express my emotions. (EACS)	**.76**	.00	-.01	.16	.04
I say things to let my unpleasant feelings escape. (COPE)	**.57**	.09	.10	-.14	.27
I express my negative feelings. (COPE)	**.71**	-.05	.10	-.05	.12
I get help and advice from other people. (COPE)	.35	**.80**	-.09	.07	.02
I try to get advice or help from other people about what to do. (COPE)	.35	**.77**	-.09	.09	.10
I get emotional support from others. (COPE)	.41	**.69**	-.01	.17	.11
I get comfort and understanding from someone. (COPE)	.42	**.74**	-.12	.09	.00

	Factor loadings				
	1	2	3	4	5
Factor 3: Rumination					
I criticize myself. (COPE)	.12	.15	**.41**	-.20	.25
I blame myself for things that happen. (COPE)	.16	.01	**.39**	-.14	.19
Think about how alone you feel (RSQ)	-.06	.00	**.66**	-.02	.08
Think "I won't be able to do my job work because I feel so badly" (RSQ)	.05	-.13	**.57**	-.11	-.01
Think about your feelings of fatigue and aches and pains (RSQ)	.13	-.26	**.48**	.20	-.08
Think about how hard it is to concentrate (RSQ)	-.06	-.15	**.56**	.08	.17
Think about how passive and unmotivated you feel (RSQ)	.01	-.07	**.68**	-.12	.08
Analyze recent events to try to understand why you are depressed (RSQ)	.03	.35	**.53**	.22	-.28
Think about how you don't seem to feel anything anymore (RSQ)	-.10	-.01	**.62**	.06	.03
Think "Why can't I get going?" (RSQ)	-.09	-.25	**.54**	.13	.14
Think "Why do I always react this way?" (RSQ)	.05	.03	**.58**	.20	.11
Go away by yourself and think about why you feel this way (RSQ)	.09	-.02	**.51**	.46	-.13
Write down what you are thinking about and analyze it (RSQ)	-.01	.03	.09	**.41**	.05
Think about a recent situation, wishing it had gone better (RSQ)	.01	.12	**.59**	.20	-.03
Think "Why do I have problems other people don't have?" (RSQ)	-.04	.02	**.59**	-.14	.23
Think about how sad you feel (RSQ)	.11	.04	**.74**	-.10	.01
Think about all your shortcomings, failings, faults, mistakes (RSQ)	-.05	.13	**.69**	-.19	.23
Think about how you don't feel up to doing anything (RSQ)	-.03	-.13	**.70**	-.09	-.02

	Factor loadings				
	1	2	3	4	5
Factor 3: Rumination. cont.					
Analyze your personality to try to understand why you are depressed (RSQ)	.02	.14	**.50**	.30	-.12
Go someplace alone to think about your feelings (RSQ)	.11	-.17	.42	**.48**	.01
Think about how angry you are with yourself (RSQ)	.10	.01	**.65**	-.19	.15
Listen to sad music (RSQ)	-.14	.11	**.47**	.15	.23
Isolate yourself and think about the reasons why you feel sad (RSQ)	.00	-.11	**.65**	.18	.07
Try to understand yourself by focusing on your depressed feelings (RSQ)	.22	.02	**.62**	.22	-.15
Factor 4: Distraction					
Try to find something positive in the situation or something you learned. (RSQ)	.09	-.06	-.20	**.65**	-.16
Think "I'm going to do something to make myself feel better" (RSQ)	.01	.07	.07	**.63**	-.01
Help someone else with something in order to distract yourself. (RSQ)	-.08	.00	.19	**.40**	-.03
Remind yourself that these feelings won't last. (RSQ)	.04	.13	-.03	**.56**	-.31
Go to a favorite place to get your mind off your feelings. (RSQ)	.04	-.03	.24	**.58**	.03
Think "I'll concentrate on something other than how I feel" (RSQ)	.02	.09	.34	**.29**	.15
Do something that has made you feel better in the past. (RSQ)	.11	.16	.04	**.65**	.04
Think "I'm going to go out and have some fun" (RSQ)	.11	.01	-.34	**.64**	.22
Concentrate on your work. (RSQ)	.18	.10	-.35	**.20**	.10
Do something you enjoy. (RSQ)	.16	-.31	-.47	**.63**	.13
Do something fun with a friend. (RSQ)	.17	-.02	-.35	**.58**	.09

	Factor loadings				
	1	2	3	4	5
Factor 5: Disengagement Coping					
I say to myself this isn t real . (COPE)	-.03	-.01	-.01	-.07	**.48**
I use alcohol or other drugs to make myself feel better. (COPE)	-.05	.36	.16	.08	**.68**
I give up trying to deal with it. (COPE)	-.28	-.08	.18	-.06	**.49**
I refuse to believe that it has happened. (COPE)	-.09	-.03	.00	.03	**.64**
I use alcohol or other drugs to help me get through it. (COPE)	-.05	.38	.11	.06	**.61**
I give up the attempt to cope. (COPE)	-.04	-.29	.18	-.08	**.51**
Take recreational drugs or drink alcohol. (RSQ)	-.16	.12	-.01	.09	**.56**
Do something reckless or dangerous. (RSQ)	.07	-.01	.29	.09	**.35**
Take your feelings out on someone else. (RSQ)	.10	-.25	**.33**	-.01	**.33**
Deliberately do something to make yourself feel worse. (RSQ)	-.11	-.06	.32	.01	**.35**

Note. Boldface indicates highest factor loadings.

Table 2

Male Coping Factor Loadings: Five Factor Solution

	Factor loadings				
	1	2	3	4	5
Factor 1: Active Coping					
I concentrate my efforts on doing something about the situation I m in. (COPE)	**.65**	.00	-.01	.03	-.03
I take action to try to make the situation better. (COPE)	**.52**	-.03	.00	-.08	.18
I try to come up with a strategy about what to do. (COPE)	**.54**	-.05	-.01	.20	.20
I think hard about what steps to take. (COPE)	**.55**	-.08	.04	.16	.04
I let my feelings come out freely. (EACS)	**.49**	.19	.02	.01	-.22
I take the time to figure out what I m really feeling. (EACS)	**.55**	.07	.17	.14	-.08
I realize that my feelings are valid and important. (EACS)	**.61**	.13	-.11	.12	-.03
I take the time to express my emotions. (EACS)	**.75**	.12	-.04	.04	-.18
I acknowledge my emotions. (EACS)	**.61**	.25	.03	.15	-.17
I allow myself to express my emotions. (EACS)	**.72**	.19	.02	-.06	-.24
I delve into my feelings to get a thorough understanding of them. (EACS)	**.67**	-.04	.20	.07	.06
I feel free to express my emotions. (EACS)	**.64**	.19	-.18	.00	-.21
I say things to let my unpleasant feelings escape. (COPE)	.23	.11	.12	.07	**.25**
I express my negative feelings. (COPE)	**.50**	.02	.23	.10	.17
Factor 2: Support from Others					
I get help and advice from other people. (COPE)	.20	**.73**	.04	.03	.09
I try to get advice or help from other people about what to do. (COPE)	.15	**.78**	.03	-.02	-.05
I get emotional support from others. (COPE)	.30	**.75**	.01	-.03	.08
I get comfort and understanding from someone. (COPE)	.27	**.72**	-.01	.13	.06

	Factor loadings				
	1	2	3	4	5
Factor 3: Rumination					
I criticize myself. (COPE)	.11	.22	.40	.11	**.43**
I blame myself for things that happen. (COPE)	.07	.12	.36	.07	**.41**
Think about how alone you feel (RSQ)	.06	.03	**.67**	.09	.03
Think "I won't be able to do my job work because I feel so badly" (RSQ)	.00	.10	**.70**	-.03	.07
Think about your feelings of fatigue and aches and pains (RSQ)	-.09	.10	**.46**	-.01	.26
Think about how hard it is to concentrate (RSQ)	-.16	.30	**.57**	.20	-.04
Think about how passive and unmotivated you feel (RSQ)	-.25	.14	**.54**	.04	.05
Analyze recent events to try to understand why you are depressed (RSQ)	.18	-.31	**.57**	.25	-.04
Think about how you don't seem to feel anything anymore (RSQ)	-.13	.19	**.55**	.02	.04
Think "Why can't I get going?" (RSQ)	-.04	.20	**.60**	.06	-.04
Think "Why do I always react this way?" (RSQ)	-.01	.12	**.70**	.05	.09
Go away by yourself and think about why you feel this way (RSQ)	.16	-.09	**.67**	.19	-.15
Write down what you are thinking about and analyze it (RSQ)	.17	-.03	**.25**	.03	.16
Think about a recent situation. wishing it had gone better (RSQ)	.01	.16	**.47**	.22	.13
Think "Why do I have problems other people don't have?" (RSQ)	-.04	.11	**.66**	.05	.15
Think about how sad you feel (RSQ)	.07	-.08	**.76**	-.14	.18
Think about all your shortcomings. failings. faults. mistakes (RSQ)	-.01	.05	**.67**	-.11	.36
Think about how you don't feel up to doing anything (RSQ)	-.23	.13	**.58**	-.07	.19

	Factor loadings				
	1	2	3	4	5
Factor 3: Rumination. cont.					
Analyze your personality to try to understand why you are depressed (RSQ)	.23	-.25	**.55**	.19	.12
Go someplace alone to think about your feelings (RSQ)	.18	-.07	**.56**	.17	-.13
Think about how angry you are with yourself (RSQ)	.05	-.08	**.56**	.07	.35
Listen to sad music (RSQ)	.20	-.02	**.40**	-.08	-.04
Isolate yourself and think about the reasons why you feel sad (RSQ)	.27	-.12	**.60**	-.04	-.03
Try to understand yourself by focusing on your depressed feelings (RSQ)	.25	-.05	**.70**	-.12	.00
Factor 4: Distraction					
Try to find something positive in the situation or something you learned. (RSQ)	.25	-.02	-.05	**.50**	-.20
Think "I'm going to do something to make myself feel better" (RSQ)	.05	-.10	.19	**.59**	-.08
Help someone else with something in order to distract yourself. (RSQ)	-.05	.20	.17	**.38**	-.09
Remind yourself that these feelings won't last. (RSQ)	.15	-.20	.31	**.41**	-.14
Go to a favorite place to get your mind off your feelings. (RSQ)	.07	.22	.36	**.49**	-.13
Think "I'll concentrate on something other than how I feel" (RSQ)	.00	.04	.47	**.48**	.12
Do something that has made you feel better in the past. (RSQ)	.08	.06	.24	**.63**	-.02
Think "I'm going to go out and have some fun" (RSQ)	.09	.04	-.19	**.71**	.14
Concentrate on your work. (RSQ)	.25	-.24	**-.34**	.25	.13
Do something you enjoy. (RSQ)	.17	.09	-.41	**.64**	-.09
Do something fun with a friend. (RSQ)	.12	.11	-.33	**.56**	.16

	Factor loadings				
	1	2	3	4	5
Factor 5: Disengagement Coping					
I say to myself this isn t real . (COPE)	-.10	**.37**	.30	.16	.16
I use alcohol or other drugs to make myself feel better. (COPE)	-.03	.07	.09	-.12	**.74**
I give up trying to deal with it. (COPE)	**-.35**	.29	.14	.02	.09
I refuse to believe that it has happened. (COPE)	-.09	.24	**.18**	.10	.15
I use alcohol or other drugs to help me get through it. (COPE)	-.04	.03	.04	-.06	**.69**
I give up the attempt to cope. (COPE)	-.10	.16	.16	-.19	**.33**
Take recreational drugs or drink alcohol. (RSQ)	-.10	.07	-.25	-.04	**.66**
Do something reckless or dangerous. (RSQ)	-.14	-.25	.23	.03	**.40**
Take your feelings out on someone else. (RSQ)	-.10	-.03	.27	.01	**.33**
Deliberately do something to make yourself feel worse. (RSQ)	-.14	-.05	**.40**	-.13	.15

Note. Boldface indicates highest factor loadings.

Table 3

Males Means, Standard Deviations, and Correlations Among the 14 Coping Indicators

	M	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Active coping	2.10	.71													
2. Planning	1.78	.49	.70												
3. Emotional processing	1.74	.43	.47	.60											
4. Emotional expression	1.60	.40	.28	.67	.66										
5. Venting	1.36	.26	.27	.36	.37	.63									
6. Using emotional support	1.35	.18	.12	.31	.33	.20	.76								
7. Using instrumental support	1.32	.12	.09	.21	.23	.12	.75	.78							
8. Rumination	.91	.05	.09	.17	-.01	.27	.09	.12	.53						
9. Self-blame	1.23	.12	.23	.15	-.10	.33	.18	.18	.47	.78					
10. Distraction	1.43	.12	.27	.33	.19	.24	.14	.09	.21	.14	.43				
11. Dangerous activities	.61	-.11	-.11	-.20	-.23	.22	-.01	-.02	.26	.17	.01	.47			
12. Behavioral disengagement	.48	-.24	-.17	-.14	-.19	-.06	.08	.09	.17	.22	-.12	.15	.54		
13. Denial	.19	-.01	.01	.11	-.10	.11	.17	.12	.26	.29	.14	.07	.29	.29	
14. Substance abuse	.49	-.08	-.08	-.05	-.10	.14	.07	.03	.18	.18	-.06	.48	.20	.16	.67

Table 4

Females Means, Standard Deviations, and Correlations Among the 14 Coping Indicators

	M	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.
1. Active coping	2.17	.64													
2. Planning	1.90	.59	.64												
3. Emotional processing	2.04	.53	.57	.62											
4. Emotional expression	2.10	.51	.40	.67	.69										
5. Venting	1.67	.35	.38	.52	.60	.69									
6. Using emotional support	2.08	.33	.25	.42	.44	.31	.79								
7. Using instrumental support	1.99	.30	.280	.37	.34	.27	.85	.82							
8. Rumination	1.01	.02	.05	.05	.03	.17	.00	-.04	.53						
9. Self-blame	1.20	.07	.08	.02	.11	.26	.08	.01	.39	.77					
10. Distraction	1.53	.11	.18	.16	.16	.02	.23	.17	.04	-.14	.46				
11. Dangerous activities	.52	-.14	-.10	-.09	-.09	.14	-.06	-.04	.35	.22	-.02	.45			
12. Behavioral disengagement	.40	-.34	-.18	-.26	-.15	-.03	-.20	-.16	.23	.20	-.13	.21	.56		
13. Denial	.23	-.15	-.11	-.10	-.11	.07	-.01	-.01	.05	.10	-.05	.20	.45	.31	
14. Substance abuse	.30	-.10	.02	-.01	-.05	.10	.19	.18	.18	.18	-.01	.49	.22	.29	.53

Table 5

Goodness-of-Fit Indices for CFA Models of Females Coping Styles

Model	χ^2	df	$\Delta\chi^2$	Δdf	χ^2/df	RMSEA	90% CI	CFI	SRMR
M_1	215.39***	74			2.91	.07	.06 - .09	.59	.08
M_2	120.29***	50	95.10***	24	2.40	.08	.06 - .10	.93	.07
M_3	154.62***	72	34.33*	22	2.15	.07	.06 - .09	.94	.07
M_4	136.13***	71	18.49***	1	1.92	.06	.05 - .08	.95	.06

Note. M_1 = five-factor model with correlated factors; M_2 = five-factor model with correlated factors and with Substance Abuse and Dangerous Activities removed from the model; M_3 = five-factor model with correlated factors, with Substance Abuse and Dangerous Activities removed from the model, and with Emotional Support and Behavioral Disengagement broken into their two questionnaire items; M_4 = five-factor model with correlated factors, with Substance Abuse and Dangerous Activities removed from the model, with Emotional Support and Behavioral Disengagement broken into their two questionnaire items, and with Venting loading on both Active Coping and Rumination. RMSEA = root-mean-square error of approximation; 90% CI = 90% confidence interval for RMSEA; CFI = comparative fit index; SRMR = standardized root-mean residual. *p < .05. **p < .01. ***p < .001.

Table 6

Goodness-of-Fit Indices for Tests of Invariance Across Gender

Model	χ^2	df	$\Delta\chi^2$	Δdf	H_0
Baseline multi-group	251.94***	118			
Factor intercorrelations invariant	273.71***	129	21.77*	11	No deterioration in fit: rejected
Factor loadings invariant	282.47***	138	8.76	9	No deterioration in fit: accepted

Note. *p < .05. **p < .01. ***p < .001.

Table 7

Adolescents Mean Cortisol Levels (μg/dl) for the Seven Saliva Samples

	Males		Females	
	M	*SD*	*M*	*SD*
Sample #1 (entry)	.23	.15	.19	.12
Sample #2 (anticipation)	.27	.20	.23	.16
Sample #3 (discussion)	.24	.16	.23	.17
Sample #4 (completion)	.21	.15	.21	.14
Sample #5 (recovery)	.18	.12	.20	.14
Sample #6 (recovery)	.17	.10	.19	.12
Sample #7 (recovery)	.16	.13	.18	.11

Table 8

Adolescents Mean Coping Scores

	Males		Females	
	M	*SD*	*M*	*SD*
Active coping	1.72_{a}	.48	1.97_{b}	.51
Support from others	1.33_{a}	.72	2.03_{b}	.77
Rumination	1.17_{a}	.49	1.29_{b}	.48
Distraction	1.43_{a}	.43	1.53_{b}	.46
Disengagement coping	$.33_{a}$	.34	$.31_{a}$	.38

Note. Means in the same row that do not share subscripts differ at $p < .05$.

Table 9

Intercorrelations Among Adolescents Own Coping Styles and their Partners Coping Styles

	1	2	3	4	5	6	7	8	9	10
1. Male active coping	---									
2. Male support	.28***	---								
3. Male rumination	.42***	.22**	---							
4. Male distraction	.31***	.13	.25**	---						
5. Male disengagement	-.16*	.14	.24**	-.04	---					
6. Female active coping	.00	-.02	.04	-.03	.07	---				
7. Female support	-.13	.01	-.07	-.10	.00	.44***	---			
8. Female rumination	-.01	-.05	.07	.09	.03	.46***	.16*	---		
9. Female distraction	.03	-.02	.08	-.11	.00	.16*	.21**	-.06	---	
10. Female disengagement	-.07	.13	.10	-.05	.04	-.22**	-.14*	.18*	-.12	---

Note. *p < .05. **p < .01.

Table 10

Estimation of Males Own Coping Styles Predicting Their Cortisol Reactivity

Predictor	Estimate	*SE*	*t (df)*	*p*
Male cortisol level at discussion point				
Intercept	.223	.011	20.732 (179)	.000
Male blood contamination	.058	.031	1.851 (179)	.065
Male allergy medication	.135	.048	2.791 (179)	.006
Male active coping	-.003	.026	-.102 (179)	.919
Male support from others	.012	.015	.794 (179)	.428
Male rumination	.038	.025	1.534 (179)	.127
Male distraction	-.006	.025	-.250 (179)	.803
Male disengagement coping	-.035	.033	-1.076 (179)	.284
Male rate of change at discussion point				
Intercept	-.059	.007	-8.227 (181)	.000
Male active coping	.016	.018	.859 (181)	.392
Male support from others	-.010	.011	-.954 (181)	.342
Male rumination	-.015	.017	-.894 (181)	.373
Male distraction	-.010	.017	-.571 (181)	.568
Male disengagement coping	.027	.023	1.184 (181)	.238
Male curvature across trajectory				
Intercept	-.042	.011	-3.795 (180)	.000
Male allergy medication	-.114	.056	-2.045 (180)	.042
Male active coping	-.014	.028	-.498 (180)	.619

Predictor	Estimate	*SE*	*t (df)*	*p*
Male curvature across trajectory, cont.				
Male support from others	-.034	.016	-2.103 (180)	.037
Male rumination	.001	.026	.022 (180)	.983
Male distraction	.028	.026	1.055 (180)	.293
Male disengagement coping	-.017	.035	-.486 (180)	.627

Table 11

Estimation of Females Own Coping Styles Predicting Their Cortisol Reactivity

Predictor	Estimate	*SE*	*t (df)*	*p*
Female cortisol level at discussion point				
Intercept	.216	.011	20.021 (179)	.000
Female blood contamination	.079	.022	3.553 (179)	.001
Female antibiotic medication	.137	.046	2.943 (179)	.004
Female active coping	.021	.026	.804 (179)	.423
Female support from others	-.005	.015	-.343 (179)	.732
Female rumination	-.005	.026	-.209 (179)	.835
Female distraction	-.026	.023	-1.111 (179)	.269
Female disengagement coping	.004	.029	.126 (179)	.900
Female rate of change at discussion point				
Intercept	-.021	.005	-4.411 (181)	.000
Female active coping	.008	.012	.671 (181)	.503
Female support from others	.001	.007	.165 (181)	.869
Female rumination	.000	.012	-.029 (181)	.977
Female distraction	-.012	.011	-1.170 (181)	.244
Female disengagement coping	.010	.013	.769 (181)	.443
Female curvature across trajectory				
Intercept	-.043	.008	-5.177 (180)	.000
Female antibiotic medication	-.115	.037	-3.084 (180)	.003
Female active coping	-.029	.020	-1.427 (180)	.155

Predictor	Estimate	*SE*	*t (df)*	*p*
Female curvature across trajectory. cont.				
Female support from others	.017	.012	1.436 (180)	.153
Female rumination	.018	.020	.899 (180)	.370
Female distraction	.014	.018	.772 (180)	.441
Female disengagement coping	.003	.023	.110 (180)	.913

Table 12

Final Estimation of Level 2 Predictors of Males Cortisol Reactivity

Predictor	Estimate	*SE*	*t (df)*	*p*
Male cortisol level at discussion point				
Intercept	.223	.010	21.752 (170)	.000
Male allergy medication	.086	.039	2.228 (170)	.027
Male active coping	-.002	.027	-.065 (170)	.948
Male support from others	.021	.015	1.374 (170)	.171
Male rumination	.023	.025	.928 (170)	.355
Male distraction	-.012	.025	-.488 (170)	.626
Male disengagement coping	-.024	.033	-.734 (170)	.464
Female active coping	-.041	.026	-1.566 (170)	.119
Female support from others	.041	.015	2.722 (170)	.008
Female rumination	.057	.026	2.206 (170)	.029
Female distraction	.005	.024	.229 (170)	.819
Female disengagement coping	.002	.030	.075 (170)	.941
Female active coping*male active coping	-.049	.042	-1.157 (170)	.249
Female support from others* male support from others	.000	.018	-.027 (170)	.979
Female rumination*male rumination	.119	.044	2.692 (170)	.008
Female distraction*male distraction	.051	.053	.967 (170)	.335
Female disengagement*male disengagement	.117	.083	1.412 (170)	.160

Predictor	Estimate	*SE*	*t (df)*	*p*
Male rate of change at discussion point				
Intercept	-.059	.007	-8.486 (171)	.000
Male active coping	.020	.019	1.077 (171)	.283
Male support from others	-.015	.011	-1.396 (171)	.164
Male rumination	-.017	.017	-.999 (171)	.320
Male distraction	-.006	.017	-.327 (171)	.744
Male disengagement coping	.033	.022	1.485 (171)	.139
Female active coping	-.005	.018	-.260 (171)	.795
Female support from others	-.012	.010	-1.152 (171)	.251
Female rumination	-.006	.018	-.346 (171)	.729
Female distraction	.022	.016	1.351 (171)	.179
Female disengagement coping	-.003	.021	-.147 (171)	.884
Female active coping*male active coping	.024	.029	.832 (171)	.407
Female support from others* male support from others	.040	.012	3.219 (171)	.002
Female rumination*male rumination	-.012	.031	-.391 (171)	.696
Female distraction*male distraction	-.013	.037	-.344 (171)	.731
Female disengagement*male disengagement	.009	.058	.152 (171)	.880

Predictor	Estimate	*SE*	*t (df)*	*p*
Male curvature across trajectory				
Intercept	-.045	.010	-4.327 (171)	.000
Male active coping	-.025	.028	-.910 (171)	.364
Male support from others	-.038	.016	-2.392 (171)	.018
Male rumination	.000	.026	.007 (171)	.995
Male distraction	.030	.026	1.160 (171)	.248
Male disengagement coping	-.026	.034	-.776 (171)	.439
Female active coping	.023	.027	.870 (171)	.386
Female support from others	-.044	.016	-2.811 (171)	.006
Female rumination	-.032	.027	-1.182 (171)	.293
Female distraction	.008	.024	.313 (171)	.754
Female disengagement coping	-.025	.031	-.813 (171)	.418
Female active coping*male active coping	.040	.044	.920 (171)	.359
Female support from others* male support from others	.047	.018	2.562 (171)	.012
Female rumination*male rumination	-.067	.046	-1.470 (171)	.143
Female distraction*male distraction	-.009	.055	-.169 (171)	.867
Female disengagement*male disengagement	-.005	.086	-.059 (171)	.953

Table 13

Final Estimation of Level 2 Predictors of Females Cortisol Reactivity

Predictor	Estimate	*SE*	*t (df)*	*p*
Female cortisol level at discussion point				
Intercept	.220	.011	20.863 (170)	.000
Female blood contamination	.077	.023	3.372 (170)	.001
Female active coping	.012	.027	.432 (170)	.666
Female support from others	.000	.016	.007 (170)	.995
Female rumination	.016	.027	.596 (170)	.551
Female distraction	-.020	.025	-.796 (170)	.427
Female disengagement coping	-.022	.031	-.707 (170)	.480
Male active coping	-.028	.028	-1.024 (170)	.308
Male support from others	.025	.016	1.566 (170)	.119
Male rumination	.005	.026	.177 (170)	.860
Male distraction	-.016	.026	-.593 (170)	.554
Male disengagement coping	.002	.034	.073 (170)	.942
Female active coping*male active coping	.036	.044	.831 (170)	.407
Female support from others* male support from others	-.015	.019	-.831 (170)	.407
Female rumination*male rumination	.063	.046	1.381 (170)	.169
Female distraction*male distraction	-.065	.055	-1.182 (170)	.239
Female disengagement*male disengagement	.112	.086	1.296 (170)	.197

Predictor	Estimate	*SE*	*t (df)*	*p*
Female rate of change at discussion point				
Intercept	-.017	.005	-3.778 (170)	.000
Female having a cold	-.048	.020	-2.420 (170)	.017
Female active coping	.006	.012	.538 (170)	.591
Female support from others	.000	.007	.048 (170)	.962
Female rumination	-.001	.011	-.104 (170)	.918
Female distraction	-.006	.010	-.620 (170)	.536
Female disengagement coping	.010	.013	.740 (170)	.460
Male active coping	-.012	.012	-.999 (170)	.320
Male support from others	.010	.007	1.522 (170)	.130
Male rumination	-.011	.011	-.984 (170)	.327
Male distraction	.012	.011	1.067 (170)	.288
Male disengagement coping	.009	.015	.618 (170)	.537
Female active coping*male active coping	-.036	.019	-1.939 (170)	.054
Female support from others* male support from others	.016	.008	2.029 (170)	.044
Female rumination*male rumination	-.026	.020	-1.293 (170)	.198
Female distraction*male distraction	.026	.024	1.080 (170)	.282
Female disengagement*male disengagement	-.014	.037	-.390 (170)	.697

Predictor	Estimate	*SE*	*t (df)*	*p*
Female curvature across trajectory				
Intercept	-.046	.008	-5.765 (171)	.000
Female active coping	-.021	.020	-1.001 (171)	.319
Female support from others	.011	.012	.962 (171)	.338
Female rumination	.004	.020	.218 (171)	.828
Female distraction	.009	.019	.478 (171)	.633
Female disengagement coping	.025	.024	1.045 (171)	.298
Male active coping	.019	.021	.925 (171)	.357
Male support from others	-.023	.012	-1.933 (171)	.054
Male rumination	-.011	.020	-.548 (171)	.584
Male distraction	-.007	.020	-.339 (171)	.735
Male disengagement coping	-.020	.025	-.787 (171)	.433
Female active coping*male active coping	-.031	.033	-.938 (171)	.350
Female support from others* male support from others	.005	.014	.339 (171)	.734
Female rumination*male rumination	-.078	.035	-2.241 (171)	.026
Female distraction*male distraction	.036	.042	.855 (171)	.394
Female disengagement*male disengagement	-.057	.065	-.869 (171)	.387

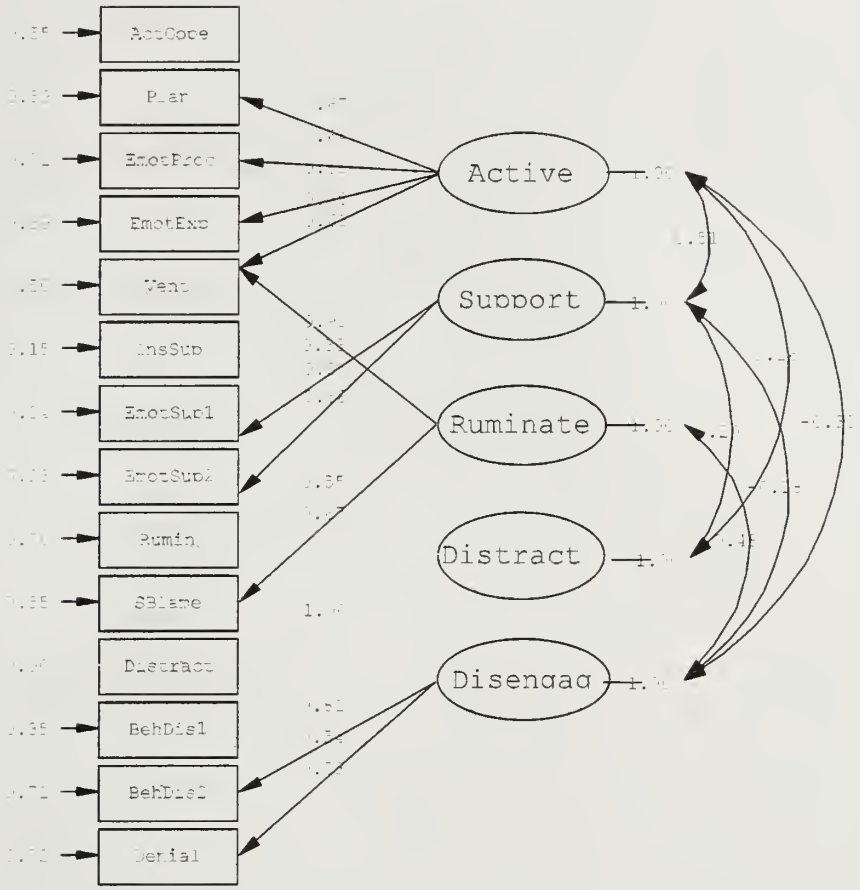

Figure 1. Standardized solution for final path model of females coping strategies.

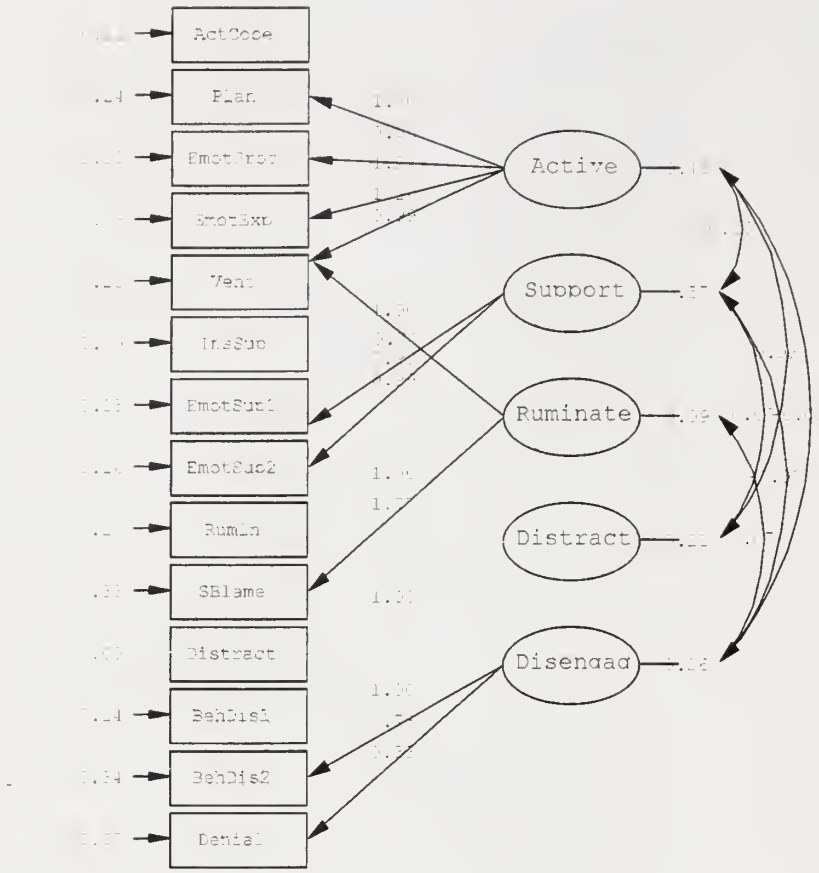

Figure 2. Unstandardized solution for females path model for final test of invariance.

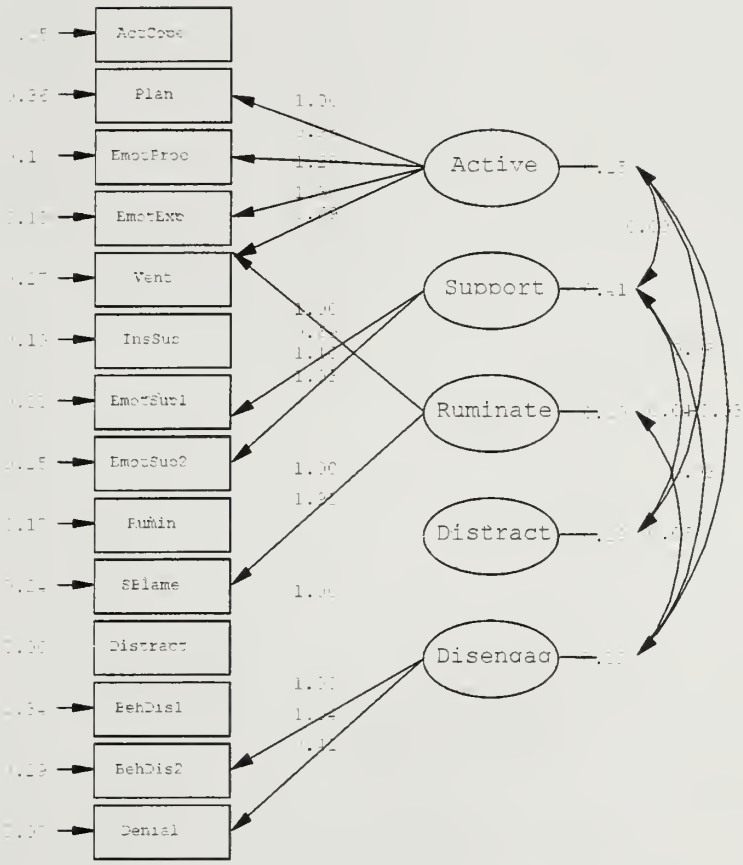

Figure 3. Unstandardized solution for males path model for final test of invariance.

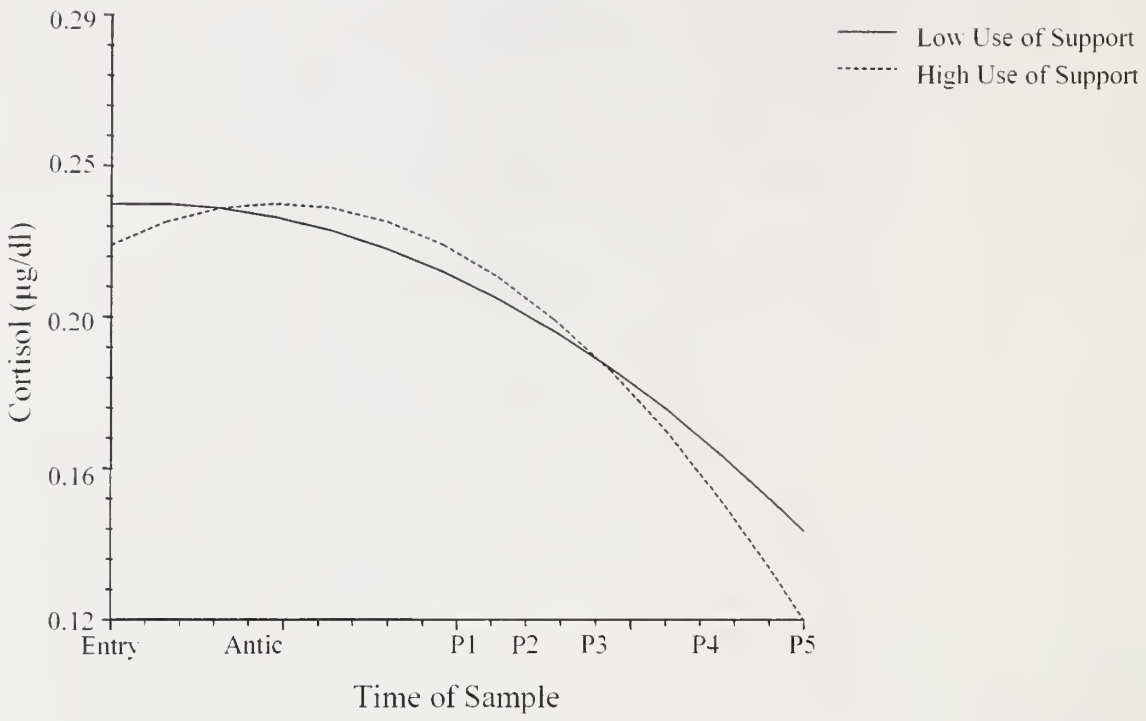

Figure 4. Males cortisol trajectories predicted by their use of support from others. Entry = cortisol level immediately prior to entering the lab: Antic = cortisol level in response to vivid description of the upcoming task (anticipatory): P1 = cortisol level during the middle of the task (discussion point): P2 = cortisol level at the end of the task: P3, P4, P5 = cortisol levels during recovery phase.

Figure 5. Males cortisol levels at the discussion point (P1) predicted by their girlfriends use of support from others. Entry = cortisol level immediately prior to entering the lab; Antic = cortisol level in response to vivid description of the upcoming task (anticipatory); P1 = cortisol level during the middle of the task (discussion point); P2 = cortisol level at the end of the task; P3, P4, P5 = cortisol levels during recovery phase.

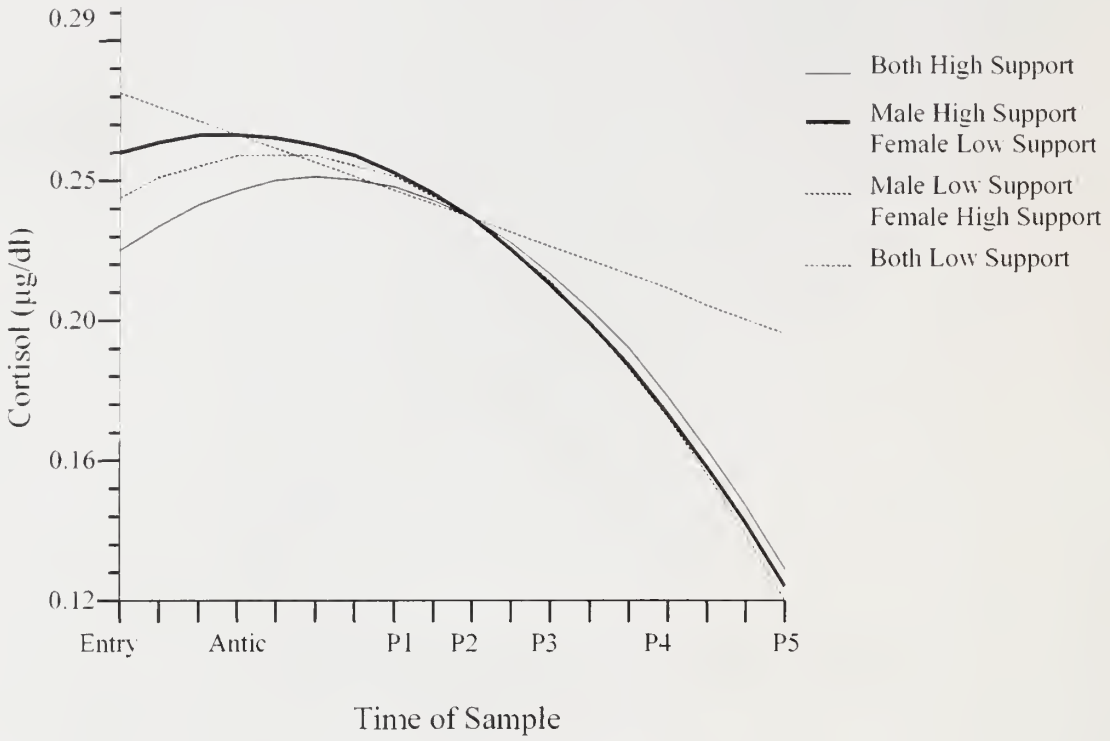

Figure 6. Males cortisol trajectories predicted by the interaction between their own use of support from others and their girlfriends use of support from others. Entry = cortisol level immediately prior to entering the lab; Antic = cortisol level in response to vivid description of the upcoming task (anticipatory); P1 = cortisol level during the middle of the task (discussion point); P2 = cortisol level at the end of the task; P3, P4, P5 = cortisol levels during recovery phase.

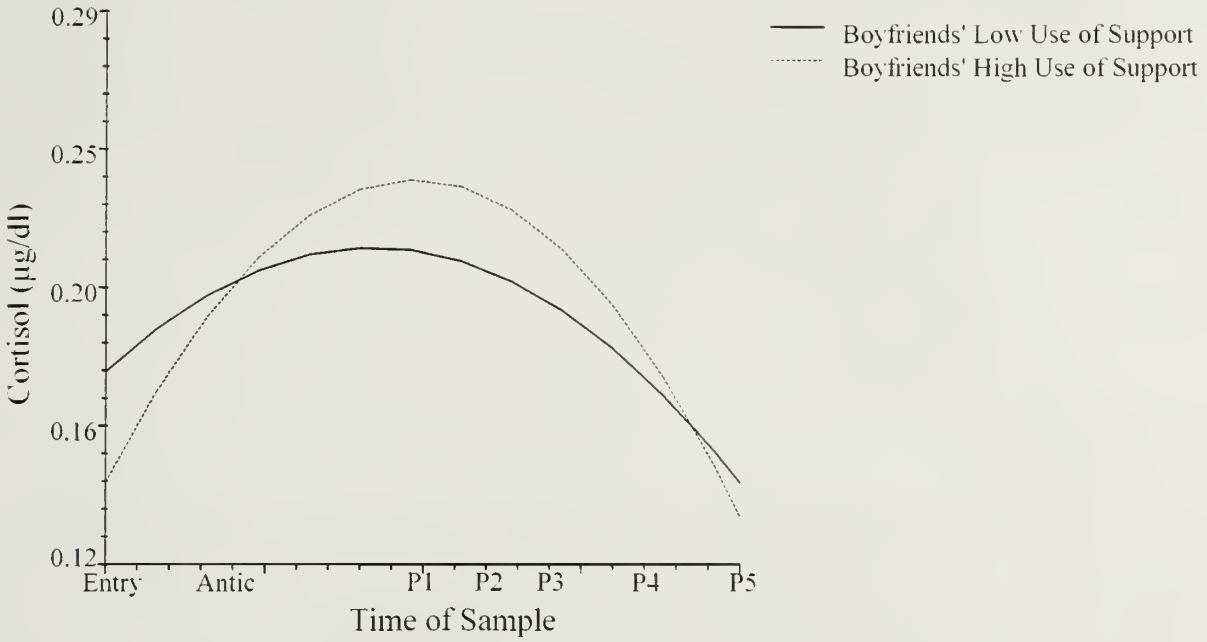

Figure 7. Females cortisol trajectories predicted by their boyfriends use of support from others. Entry = cortisol level immediately prior to entering the lab: Antic = cortisol level in response to vivid description of the upcoming task (anticipatory): P1 = cortisol level during the middle of the task (discussion point): P2 = cortisol level at the end of the task: P3. P4. P5 = cortisol levels during recovery phase.

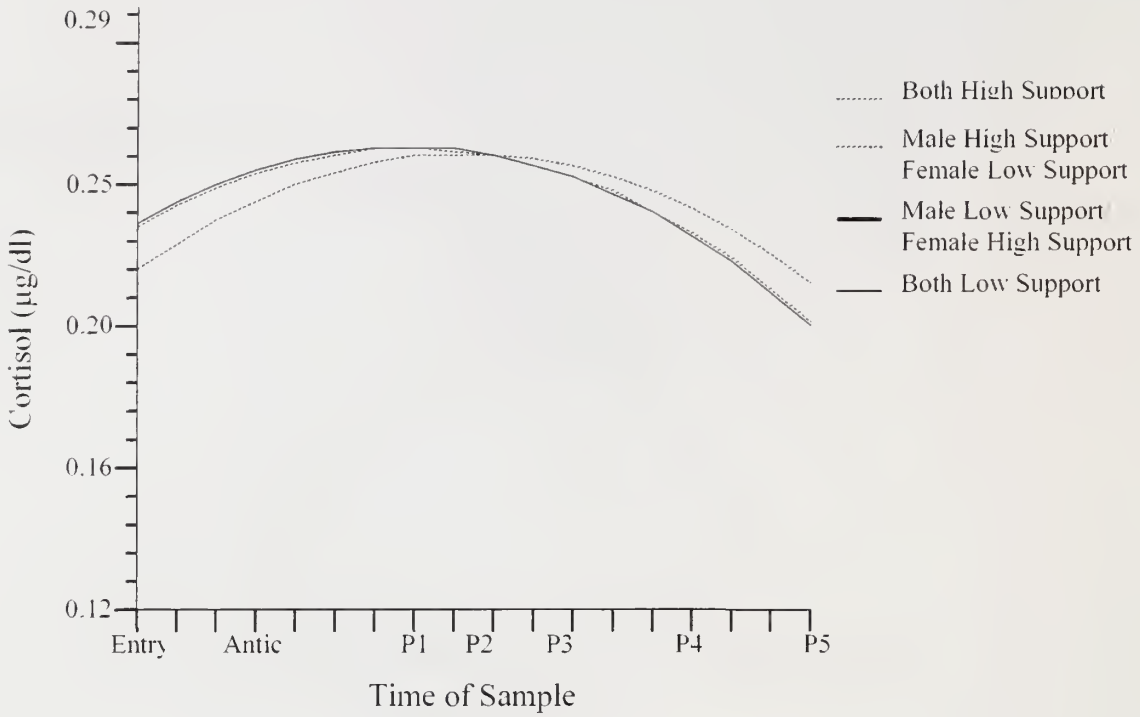

Figure 8. Females rate of change in cortisol at the discussion point (P1) predicted by the interaction between their own use of support from others and their boyfriends use of support from others. Entry = cortisol level immediately prior to entering the lab; Antic = cortisol level in response to vivid description of the upcoming task (anticipatory); P1 = cortisol level during the middle of the task (discussion point); P2 = cortisol level at the end of the task; P3, P4, P5 = cortisol levels during recovery phase.

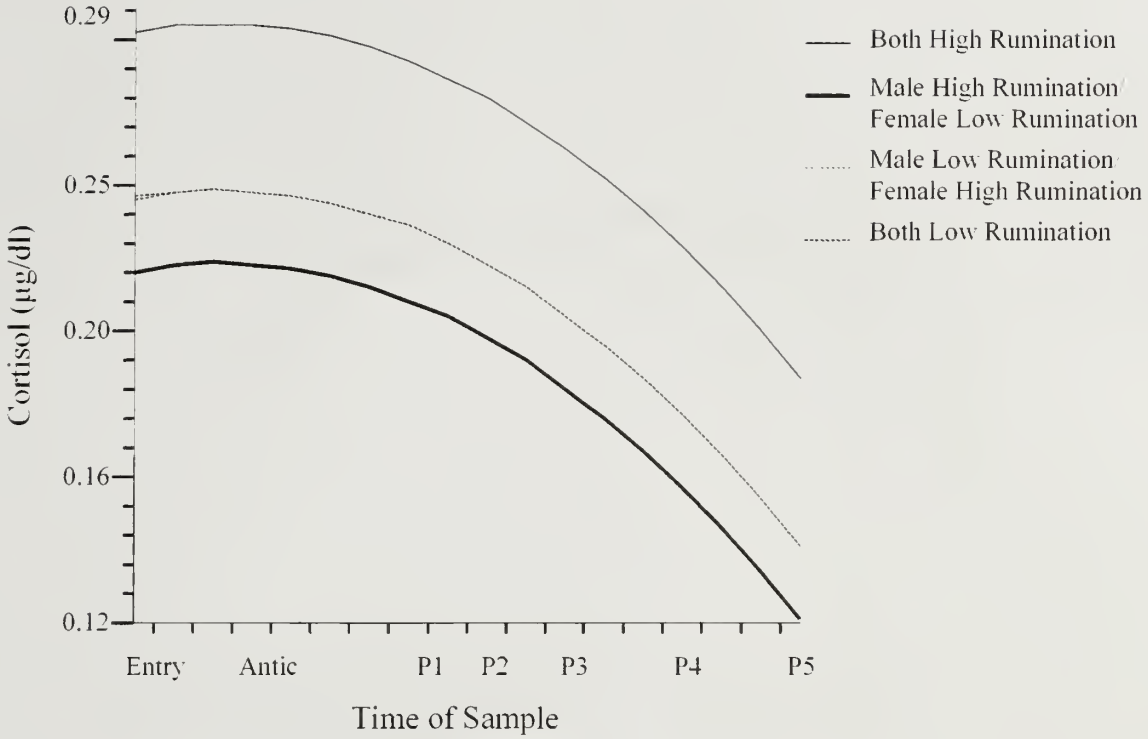

Figure 9. Males cortisol levels at the discussion point (P1) predicted by the interaction between their own rumination and their girlfriends rumination. Entry = cortisol level immediately prior to entering the lab: Antic = cortisol level in response to vivid description of the upcoming task (anticipatory): P1 = cortisol level during the middle of the task (discussion point): P2 = cortisol level at the end of the task: P3, P4, P5 = cortisol levels during recovery phase.

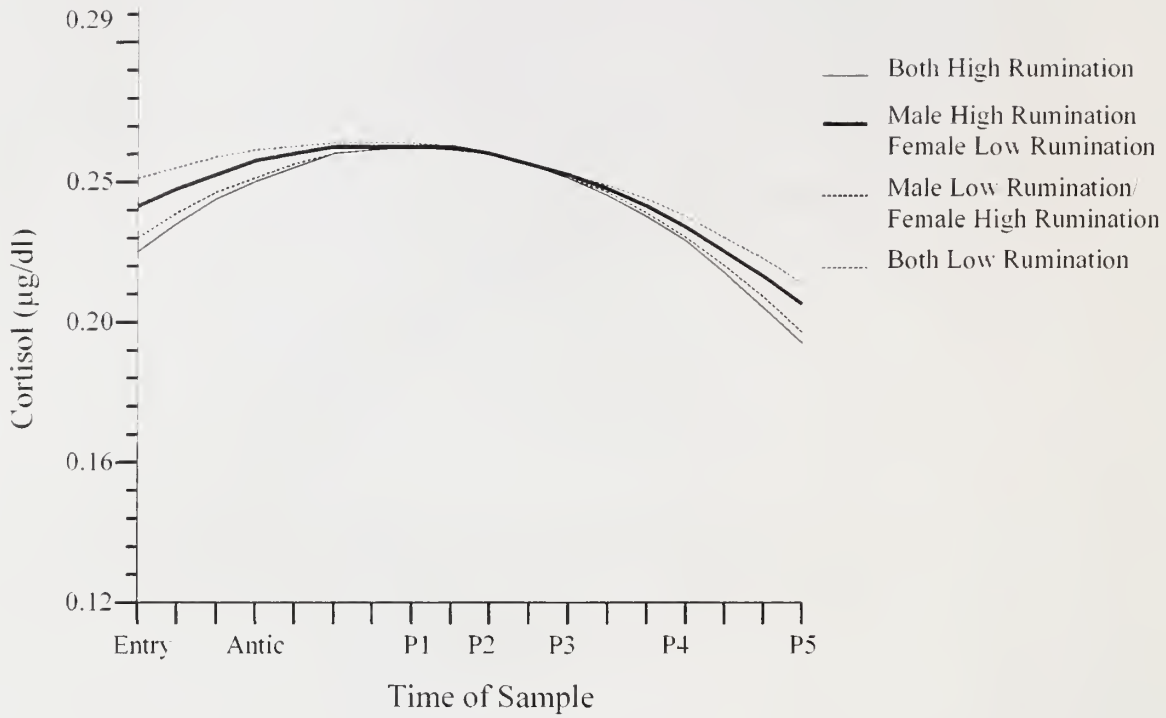

Figure 10. Females cortisol trajectories predicted by the interaction between their own rumination and their boyfriends rumination. Entry = cortisol level immediately prior to entering the lab; Antic = cortisol level in response to vivid description of the upcoming task (anticipatory); P1 = cortisol level during the middle of the task (discussion point); P2 = cortisol level at the end of the task; P3, P4, P5 = cortisol levels during recovery phase.

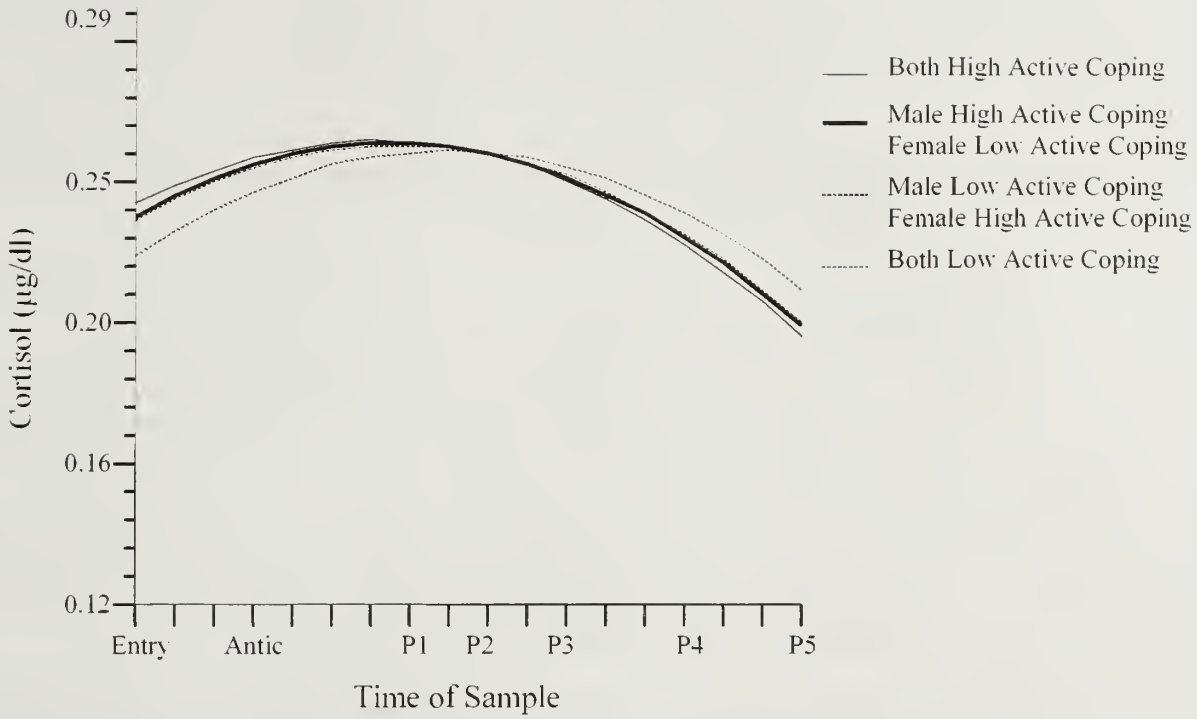

Figure 11. Females rate of change in cortisol at the discussion point (P1) predicted by the interaction between their own use of active coping and their boyfriends use of active coping. Entry = cortisol level immediately prior to entering the lab; Antic = cortisol level in response to vivid description of the upcoming task (anticipatory); P1 = cortisol level during the middle of the task (discussion point); P2 = cortisol level at the end of the task; P3, P4, P5 = cortisol levels during recovery phase.

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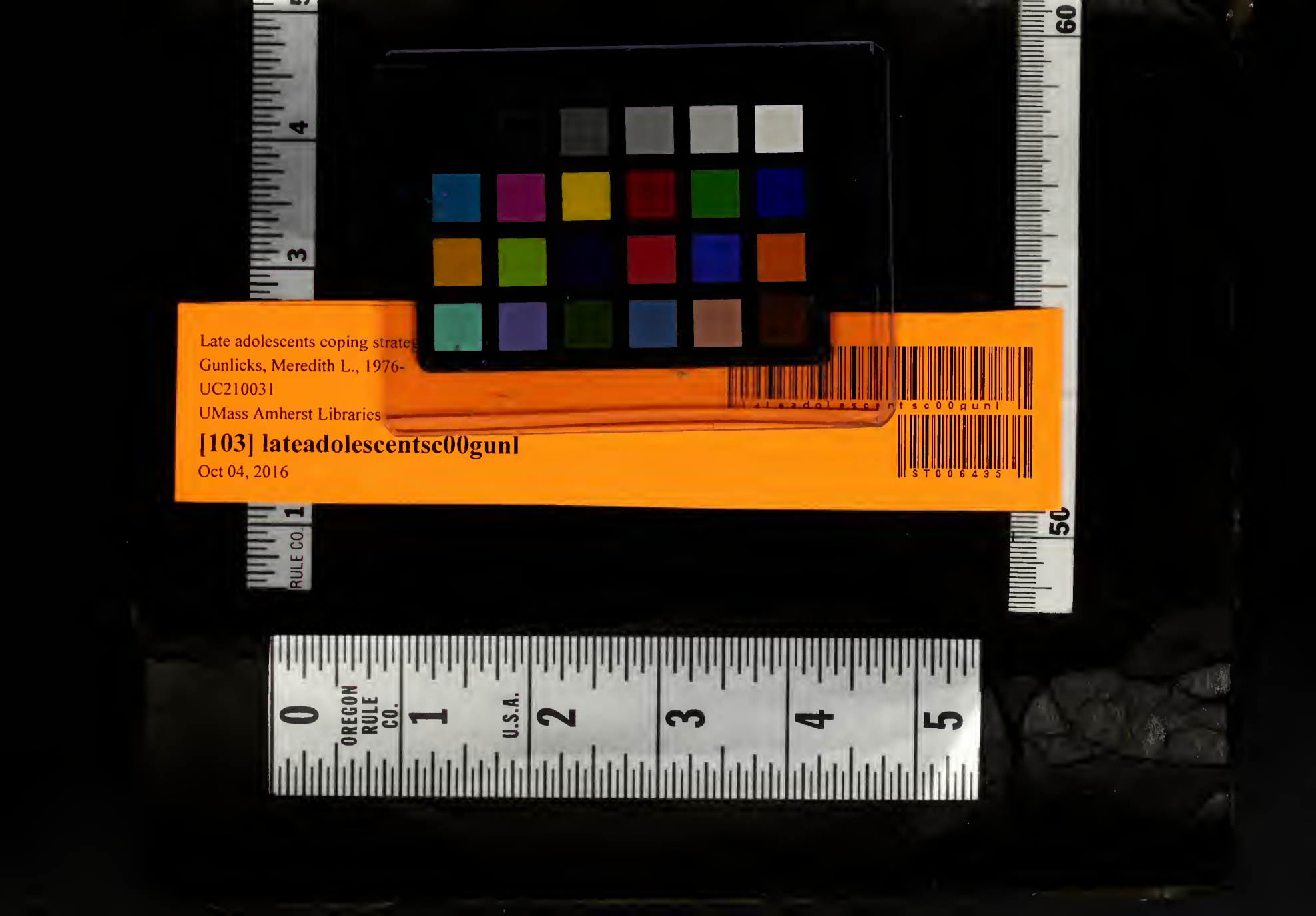
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FROM THE DISCOVERY TO RATIONALIZATION OF OTHERS LIES:

HOW PERCEIVERS PROCESS AND JUDGE DECEPTION

A Dissertation Presented

by

BRENT WEISS

Submitted to the Graduate School of the
University of Massachusetts Amherst in partial fulfillment
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

February 2006

Psychology

FROM THE DISCOVERY TO RATIONALIZATION OF OTHERS LIES: HOW PERCEIVERS PROCESS AND JUDGE DECEPTION.

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Approved as to style and content by:

_____

Robert S. Feldman, Chair

_____

Ronnie Janoff-Bulman, Member

_____

Marian MacDonald, Member

_____

Robert Marx, Member

_____

Melinda Novak, Chair
Department of Psychology

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A Dissertation Presented

by

Brent Weiss

Approved as to style and content by:

Robert S. Feldman, Chair

Ronnie Janoff-Bulman, Member

Marian MacDonald, Member

Robert Marx, Member

Melinda Novak, Chair
Department of Psychology

DEDICATION

To my parents who have supported me in all my adventures.

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ABSTRACT

FROM THE DISCOVERY TO RATIONALIZATION OF OTHERS LIES:

HOW PERCEIVERS PROCESS AND JUDGE DECEPTION

FEBRUARY 2006

BRENT WEISS, B.A., HUNTER COLLEGE

M.A., UNIVERSITY OF MASSACHUSETTS AMHERST

Ph.D., UNIVERSITY OF MASSACHUSETTS AMHERST

Directed by: Professor Robert Feldman

The present project tested a theoretical framework for the deception judgment process. The framework argues that the deception judgment process begins when a perceiver first becomes suspicious of deception. This engages the perceiver to attempt to verify the speaker s claims. If the claims are deemed untrue, in an effort to classify the statement as a lie, the perceiver then examines the speaker s motives. If deemed a lie, the perceiver decides what to do about the deception, often taking into consideration the speaker s motives for lying. Three studies tested this framework. The first study examined the information perceivers used to distinguish lies from non-lies; the second study examined how the various forms of information were utilized and weighed in the deception judgment process; and finally, the third study examined the information processing strategies perceivers used to process deception. Overall, it was found that perceivers used several forms of information (e.g., logical inconsistencies, facts, and motives) when considering and judging deception. However, only facts were used to draw a conclusion regarding a statement s deceptiveness. In terms of processing

strategies, support was found for an information-processing ordering effect consistent with the proposed model. Implications and future research are discussed.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

CHAPTER I

HOW PERCEIVERS PROCESS AND JUDGE DECEPTION

A. Introduction

When it comes to interpersonal contexts, lying is about as certain as death and taxes: defendants lie about their guilt (Robinson, 1994); labor negotiators lie to win the upper hand in negotiations (Friedman & Shapiro, 1995); managers lie to cover their mistakes (Darley, 1996); detectives lie to catch criminals (Shulman 2000); nurses lie to protect their patients (Tuckett, 1998); friends lie to cover misdeeds (Feldman, Cauffman, Jensen, & Arnett, 2000); even romantic partners lie about their sexual histories (Williams & Payne, 2002).

Given the ubiquity of lying, one might presume its societal acceptance -- but, of course, it is not acceptable (Kowalski, Walker, Wilkinson, Queen, & Sharpe, 2003; Robinson, 1994). In the most general sense, deception undermines people s trust in one another (Tuckett, 1998) and adversely impacts one's credibility (Friedman & Shapiro, 1995). As a result, when people are caught lying, there are usually negative consequences (Sims, 2000; Robinson, 1994). For instance, defendants are charged with perjury; negotiators are shunned from their profession; managers indicted for fraud; detectives themselves incarcerated; nurses sued; friendships dismantled; and marriages irreparably broken.

As can be seen, deception offers the deceiver both risks and rewards. However, throughout this paper, I will contend that the rewards of lying far outweigh the risks for two primary reasons: first, because people incorrectly process others deception (DePaulo, Lindsey, & Malone, 2003; Anderson, DePaulo, & Ansfield 2002; Toris &

DePaulo, 1985), most lies simply go undetected; and second, deceivers use a variety of strategies to deflect disapproval.

However, to better understand the nature of deception detection and how this process can be improved, this article has three primary objectives: (1) to examine reasons why deception often goes undetected; (2) to review and organize the literature on human deception detection, with the goal of examining empirical support for a proposed conceptual framework for the various steps perceivers go through when attempting to detect lies; and (3) to find direct empirical evidence that supports this framework.

To accomplish these stated objectives, this paper will be broken into several sections. The first section provides a definition of deception. The second section reviews the literature on cues known to be associated with deceptive behavior. The third section reviews the literature on cues that perceivers use to detect deception. The fourth section examines why deception often goes undetected. The fifth section proposes a framework for the various steps perceivers go through when attempting to detect deception. And, finally, the last section provides evidence for the proposed deception judgment model.

In terms of evidence, the first study examined the types of information perceivers use to distinguish lies from non-lies. The second study examined the facets of information perceivers weigh most heavily in determining whether a person is lying or not. And finally, the third study examined the information processing steps perceivers employ when examining and judging deception.

B. Defining Deception

Lying, which for the purposes of this paper is used interchangeably with deception, is a concept that means different things to different people (Flanagan 1992;

Forsyth & Berger, 1982). For some people, lying is universally bad; for others, lying is bad but with a few notable exceptions; for others, the egregiousness of lying depends upon one s personal values; whereas, for others, lying unconditionally depends upon the situational context (Forsyth & Pope, 1984; Forsyth, 1980).

Because deception means different things to different people, it is not a fixed, stable category. What constitutes lying varies over time and across situations. For instance, according to some researchers, the purposeful omission of information is regarded as lying (e.g., DePaulo, Kashy, Kirkendol, Wyer, & Epstein, 1996), whereas for other researchers, this omission of information is regarded as impression management (e.g., Leary, 1995).

In spite of these inconsistencies, there is some stability in how people construe deception (Shulman, 2000). For instance, Peterson (1995) and Flanagan (1992) contend that deception can be determined by satisfying three conditions: first, the statement must be factually false or incomplete (condition 1); second, the speaker must acknowledge the statement s falsity (condition 2); and third, the person must intend to mislead/deceive (condition 3). Of course, additional conditions, such as intent to harm, may also be inherent in people s deceptive statements. However, these are not necessary conditions in order to declare a statement a lie.

Although these three conditions generally go hand in hand, it is possible for someone to satisfy some of these conditions without actually lying. For instance, if a person made a factually false statement (i.e., satisfied condition 1), suspected that it could be untrue (i.e., partially satisfying condition 2), but had no intent to deceive (i.e., did not satisfy condition 3), then, although it could be argued that this person was reckless and

irresponsible in making the statement, it is not a lie, per se. In this case, it was not that the person knew that the statement was untrue – it is just that it could have potentially been untrue, just as much as it could have been true. Table 1 provides a more detailed outline of the various conditions that help distinguish lies from non-lies.

In addition to distinguishing lies from non-lies, Peterson (1995) and Flanagan's (1992) definition of deception also accounts for various forms of deception, such as outright lies (total falsehoods), exaggerations (overstating the facts), and subtle lies (lying through the omission or evasion of relevant details). In other words, whether one is slightly distorting details reflective of the truth (either by omitting information or embellishing a bit) or whether one is completely conjuring up a fictitious story, all of these instances are lies because they reflect statements that are factually untrue (or incomplete), with intent to mislead/create false impressions.

CHAPTER II

CUES KNOWN TO BE ASSOCIATED WITH DECEPTIVE BEHAVIOR

When engaged in deception, people carry out a variety of behaviors that deviate from the behaviors they would normally perform when telling the truth. Such deviations are referred to as cues. One set of cues are verbal cues. Verbal cues refer to the verbal aspects of deceivers messages, which indicate that they are being deceptive. Examples of verbal cues are paralinguistic cues, such as vocal pitch, vocal tone, and linguistic cues, such as the logical consistency of another s statement. In contrast to verbal cues are nonverbal cues. Nonverbal cues refer to the nonverbal aspects of deceivers messages which indicate they are being deceptive. Examples of nonverbal cues are eye contact, body tension/nervousness, and hand gestures. For the purpose of reviewing the literature in this section, I will first review the verbal cues known to be associated with deception, followed by the nonverbal cues.

Before reviewing specific cues, it should be noted that there are some inconsistencies in the literature as to which behaviors are valid cues that aid deception detection. While some of these inconsistent findings can be attributed to methodological differences, other inconsistent findings can be attributed to the fact that such cues are simply not good predictors of deception because the cues themselves are multiply determined (e.g., Is John avoiding eye contact because he is lying or because he is intimidated?). Furthermore, most people s behaviors are so idiosyncratic that one would need a baseline measure (e.g., know how John typically behaves) in order to consistently predict deception based on these cues (Zuckerman, Koestner, & Alton, 1984).

Due to these inconsistencies in the literature, to decide what were valid versus invalid cues of deception, I relied heavily on a meta-analysis conducted by DePaulo, Lindsey, & Malone (2003). This meta-analysis (combining both published and unpublished articles) included over 100 studies on deception detection.

A. Deceiver Verbal Cues

As stated previously, when it comes to assessing what one says when being truthful versus deceptive, the research literature is often inconsistent. Of course, this does not mean that all verbal cues are inconsistent predictors of deception. In fact, independent researchers have consistently found that, compared to truthful stories, deceptive stories are less plausible, relevant, consistent, detailed, and clear. Furthermore, additional research has also found that deceivers tend not to admit to making errors in their stories (e.g., liars are more adamant about their stories being factually correct).

With respect to response latency, response length, speech errors, hesitations, and pauses, however, some researchers have found effects indicating that people tend to perform these behaviors more when lying than telling the truth, whereas other researchers have been unable to replicate these findings. Moreover, sometimes researchers have even found effects in the opposite direction.

Looking at each of these cues more in-depth, research has found consistent differences in what people say when they are lying compared to their statements when they are telling the truth. Stiff and Miller (1986), for example, had participants complete a task with a confederate who urged them to cheat on a problem-solving task. After the task was completed, the participants were interviewed (and videotaped) so that the experimenter could learn about their problem-solving strategy. However, because the

participant cheated, this meant that he or she was then forced to lie in order to cover up the transgression. In order to assess the deceiver s verbal behavior, two coders watched and coded the videotapes. Truthful participant responses were found to be more plausible, definite, clear, and concise than untruthful participant responses. Other research, using a similar coding method, has extended these findings by noting that deceivers are also more reluctant to admit any errors in their stories (Kohnken et al., 1995).

When it comes to inconsistent findings, one set of findings involve response latency. Some researchers (e.g., Greene, O Hair, Cody, & Yen, 1985; Cutrow, Parks, Lucas, & Thomas, 1972) have found that liars tended to respond faster to questions than truth-tellers, whereas others (e.g., Vrij, Edward, & Bull, 2001; deTurck & Miller, 1985) have found that liars tended to respond more slowly. For example, when Greene et al. (1985) asked participants to lie about where they went on vacation, what they did there, and what the people were like, they found that participants tended to respond faster when lying than not. However, in another study when participants were interviewed about their problem-solving strategy (a task they were enticed to cheated on), deceivers took longer to respond, presumably because they had to conjure up a plausible story (deTurck & Miller, 1985). Although it is possible that this discrepancy in findings is because response latency may not be a good cue of deception, another reason for this difference might be attributable to the difficulty of the response (i.e., it is possible that lying about how one solved a problem is more difficult than lying about where one went on vacation). If response time positively varies with the difficulty of the question (i.e., the more difficult the question, the longer time needed to respond), then people might take a longer time to respond for difficult questions because they need more time to figure out

the details of the more intricate question. However, without additional research, the reason as to why some respond to questions faster when lying (compared to not lying) and others respond more slowly remains unclear. Consequently, the only conclusion that can be made here is that this cue, at present, is an inconsistent predictor of deception.

Another inconsistent finding in the literature involves response length. When it comes to determining response length, some researchers have found that deceitful responses tend to be shorter than truthful responses (e.g., Greene et al, 1985; Kraut 1978), whereas other researchers have failed to find an effect (Vrij, 1993; Stiff & Miller, 1986). In a simulated job interview, for example, deceitful candidates were more likely to give shorter answers (Kraut, 1978). However, participants who lied to detectives about possessing a pair of headphones did not tend to talk any more or less than participants who told the truth (Vrij, 1993).

Another inconsistency deals with speech errors and utterances (e.g., um , ah). While some researchers have found that deceptive messages tend to contain more excessive utterances and speech errors than truthful messages (Kohnken, Schimossek, Aschermann, & Hofer, 1995; deTurck & Miller, 1985), other researchers have been unable to find a relationship between the two (Vrij et al., 2001; Vrij, 1993; Stiff & Miller, 1986). In one study, individuals who were asked to lie about watching a blood donation video tended to say things like ah , um , well , somewhat more often than individuals who actually watched the video (Kohnken et al., 1995). But another study (where nursing students were asked to lie about a theft they had witnessed in a video) found that students made the same number of speech errors, regardless of whether they were lying or not (Vrij et al., 2001).

The final major inconsistency deals with speech pauses and hesitations. While some researchers have found that deceivers tend to pause and hesitate during discourse more than truth-tellers (deTurck & Miller, 1985; Vrij et al., 2001), DePaulo et al s (2003) meta-analysis failed to find a significant effect.

In summary, research has found that liars are consistently less forthcoming than truth tellers: liars provide fewer details; liars deceptive accounts are less compelling than truthful ones; lies are less plausible, less logically structured, and more internally discrepant; liars verbally sound less certain; and liars make fewer corrections to their stories and admit to fewer imperfections. However, other verbal behaviors, particularly paralinguistic behaviors, such as speech disturbances, pauses, response latency, and response length are not predictive of deception.

Of course, verbal discrepancies in a deceiver s speech patterns when lying versus telling the truth are not the only imperfections to appear in the deceiver s actions; discrepancies also appear in the deceiver s nonverbal behavior an issue we consider next.

B. Deceiver Nonverbal Cues

Similar to research on deceivers verbal behavior, research on deceivers nonverbal behavior is also inconsistent and, at times, contradictory. For instance, body movements, eye contact, eye blinks, and smiling inconsistently predict deception: in some studies they predict well, in others not so well. In contrast, research on body tension and pupil dilation tend to consistently find that liar s bodies are tenser and pupils more dilated than truth-tellers.

Looking at each of these cues more in-depth, when it comes to consistencies, body tension appears to be a good predictor of deception (DePaulo, Lanier, & Davis, 1983; Cutrow et al., 1972; Kraut & Poe, 1980). DePaulo et al. (1983), for instance, asked people to lie about (a) their opinions concerning a controversial university honor system, (b) their attitudes about the fraternity/sorority system, (c) their relationship with their roommate, or (d) what it would be like to be a politician in today s society. Regardless of the topic of discussion, they found that liars felt tenser than non-liars. In addition, in terms of perception, judges who subsequently rated the deceivers were able to detect body tension, but more so in males than females. Furthermore, regardless of sex, judges also rated deceivers who gave planned responses as more tense than deceivers who gave unplanned responses. As a result, it does appear that deceivers are noticeably more tense when lying than not.

Another consistent finding of deceptive nonverbal behavior was pupil size. That is, when people lie, their pupils dilate more (Heilveil, 1976). However, since we are interested in human deception detection and given the fact that this study used a pupillometer to detect deception, this nonverbal cue might be of limited utility in interpersonal contexts. Of course, this is an empirical question that has yet to be addressed.

In terms of inconsistent findings, although some research on body movements (e.g., head nodding and hand movements) indicates that deceivers tend to move less than truth tellers (Vrij, 1993; DePaulo, 1994; Greene et al., 1985), other research has been unable to replicate this finding (Vrij, Semin, & Bull, 1996).

Likewise, the frequency with which liars look perceivers in the eye is also inconsistent. One study by Bond et al. (1985), for instance, found that individuals who lied about their last job tended to make more eye contact than those who told the truth. But another study found that individuals who lied about going on vacation tended to make less eye contact than those who told the truth (Greene et al., 1985).

In a similar vein, the number of eye blinks is also an inconsistent predictor of deception. For instance, Cutrow, Parks, Lucas, & Thomas (1972), attached electrodes to the bottom of participants eyes and then asked them to lie about questions such as their name and the amount of money in their pockets. They found that people tend to blink less when lying than not lying. But Stiff and Miller (1986) and deTurck & Miller (1985) were unable to replicate this finding. It should be noted, however, that Stiff and Miller (1986) and deTurck & Miller (1985) used coders to count the number of eye blinks, compared to the Cutrow et al. s (1972) electrode methods. Therefore, the difference between findings could be attributed to the methodology.

Finally, although some researchers tend to think that smiling is indicative of lying, research on this topic is inconclusive as well. For instance, Bond et al. (1985) found that liars tend to smile less when lying about vacation travels, whereas Greene et al. (1985) found that liars tend to smile more when lying about their last job.

In summary, although body movements, eye contact, eye blinks, and smiling are not predictive of deception, pupil dilation and body tension appear to be good nonverbal cues to deception. However, because pupil size might be difficult to detect with the naked eye, body tension might be one of the few good nonverbal predictors.

CHAPTER III

CUES THAT PERCEIVERS USE TO DETECT DECEPTION

The previous section reviewed verbal and nonverbal cues that deceivers provide when lying, compared to telling the truth. Although these cues are found to be predictive of deception, people do not always use them. For instance, no research has indicated that people recognize the fact that (compared to truth-tellers) deceivers tend to make fewer corrections to their stories (Kohnken et al., 1995). Instead, it appears that people have their own theories about which cues are indicative of lying. Although some of these theories correspond with what the literature finds to be valid cues of deception, others do not. In this section, I will review the cues that people tend to use to judge deception. Paralleling the previous section, this section will first examine the verbal cues, followed by the nonverbal cues.

A. Perceiver Verbal Effects

Even in laboratory conditions, perceivers deception detection abilities are limited. For instance, in some studies (e.g., Vrij, 1993; Kraut, 1978) people s deception detection accuracy rates tend to stay close to the 50% chance level and, in some cases, the accuracy rate is even lower. For example, in one study where airline travelers were asked to smuggle a bag of white powder past customs inspectors, inspectors were required to question the passengers about the contents in their bags because some passengers were believed to possess a packet of white powder. Based on their questioning, the inspectors were asked to make a dichotomous decision as to whether they would or would not inspect the passengers bags. Results indicated that inspectors were actually less likely to

inspect those carrying the white powder than those who were not carrying the white powder (Kraut & Poe, 1980).

As a whole, it appears that people are relatively poor deception detectors. Two factors that influence their abilities are the contexts in which they learn about others deceptive statements and the verbal cues they use to detect deception.

Whether the perceiver learns about another s deceptive statement through an audio only, audio/visual, or visual only channel, the way in which one first learns of another s deceptive statement affects his or her ability to detect deception. In Heinrich and Brokenau s (1998) study, for instance, participants observed people lie about qualifications listed on their curriculum vitae, by either watching a video with sound, a silent video, or listening to an audiotape. Across the three conditions, participants were more likely to detect deception when they either watched the video with sound or listened to the audiotape, a finding consistent with other studies (e.g., DePaulo et al., 1983). Based on this, it appears that the verbal aspect of the message is a key part of detecting deception. After all, if the nonverbal aspects were more important, then the visual only condition would have led to successful deception detection. This finding makes sense in light of the fact that many nonverbal cues do not predict deception well.

In contrast to the context in which people learn about others deception, another factor that influences people s deception detection abilities is the actual cues they use. For instance, Kraut & Poe (1980) found that customs inspectors did correctly notice that evasive answers were indicative of deception. Likewise, Stiff & Miller (1986) found that perceivers correctly relied on story plausibility, clarity, and conciseness to detect deception.

When it comes to ineffective cues, in spite of the fact that some cues are relatively poor predictors of deception, perceivers tend to use them nonetheless. For instance, in Kraut & Poe s (1980) custom inspector s study, customs inspectors tended to incorrectly think that travelers were lying when they provided short answers and volunteered additional information. Likewise, in another study in which people lied about cheating with a partner on a problem-solving task, perceivers tended to incorrectly use message length to detect deception (Stiff & Miller, 1986).

In summary, it appears that perceivers are fairly inaccurate when it comes to detecting deception. Part of this is because of the channel via which the perceivers learn the deceptive message and another part is because of the (sometimes inaccurate) verbal cues that perceivers use. To improve deception detection, it appears that it is important for people to rely on the appropriate linguistic, as opposed to the paralinguistic, aspects of the deception. For instance, stories that sound evasive and ambiguous are often evasive and ambiguous for a reason: deceivers don t want perceivers to know the truth.

B. Perceiver Nonverbal Effects

When detecting deception, perceivers attend to a large number of nonverbal cues that they think are indicative of deception. Among them are eye contact, hand gestures, smiling, facial animation, body tension/nervousness, and postural shifting (shifting body weight from one foot to another). Of course, not all are valid cues for detecting deception. In this section, I will outline studies that have examined these nonverbal cues, with a discussion on which cues have found empirical support versus those which have not.

Although there is little evidence showing that many of these nonverbal cues are related to deception, some cues, such as facial expressions and body tension/nervousness, have received empirical support (Galin & Thorn, 1993; Riggio & Friedman, 1983; Kraut & Poe, 1980). For instance, in one study, videotaped participants placed their hands in a bucket of ice water and were asked to truthfully express their pain, mask the pain, or fake the pain. Because those who faked their pain tended to be more facially expressive (e.g., lower their eye brows and squint their eyes), judges who later observed these videotapes were able to consciously distinguish faked pain from genuine and masked pain (Galin & Thorn, 1993). Likewise, in another study (Kraut & Poe, 1980), when people were lying about what they were carrying in their bags, their bodies became so tense that it aroused perceivers suspicions, leading them to accurately detect the deceiver s lies.

When it comes to ineffective cues, perhaps one of the greatest myths concerning deception is that deceivers tend to avoid eye contact when lying (DePaulo et al., 2003; Kraut & Poe, 1980). For instance, when perceivers were asked to evaluate whether a person was lying about his or her job experiences, perceivers reported the belief that liars tended to avoid eye contact -- a belief not supported within the study (Bond et al., 1985).

Other unsupported beliefs are that hand gestures, smiling, and postural shifting (moving from one foot to another) indicate deception (Vrij, 1993; Stiff & Miller, 1986; Kraut & Poe, 1980). In one study (Vrij, 1993), for instance, participants were asked to lie to detectives about whether they had headphones in their pockets or not. The detectives in this study reported the belief that less smiling was indicative of deception although it was not actually related to deception.

In summary, perceivers do indeed attend to (both relevant and irrelevant) nonverbal cues in order to assist them in detecting deception. Although some cues have received strong empirical support regarding their relationship to deception detection (e.g., facial expression and tension), other cues have received little or no support (e.g., eye contact, hand gestures, and smiling).

Table 2 provides a summary of the effective verbal and nonverbal cues that perceivers use to detect another s deception, as well as the verbal and nonverbal cues that deceivers consistently leak out when lying.

At this point, we have examined the cues perceivers attend to, as well as the cues they should attend to in order to facilitate deception detection. Although one reason why deception often goes undetected is that perceivers use the wrong cues, there are more fundamental reasons a topic we will consider next.

CHAPTER IV

WHY DECEPTION OFTEN GOES UNDETECTED

Four major reasons why deception often goes undetected is because (a) deceivers themselves do not want to get caught; (b) perceivers may be biased to believe deceivers; (c) perceivers may be unmotivated to detect another s lies; and (d) perceivers attend to the wrong cues.

A. Communicators Make an Effort to Appear Truthful

One reason why deception often goes undetected is because of the rather obvious fact that deceivers themselves do not want to get caught. As a result, deceivers convince other people of their lies by appearing both sincere and credible (DePaulo et al., 1991). Deceivers lies often appear to be so because the stories themselves are often slight variations of their own personal experiences; borrowed experiences of others; or simply fictitious but plausible-sounding stories (Malone, Adams, Anderson, Ansfield, & DePaulo, 1997; DePaulo et al., 2003).

Of course, what the lie is based on (e.g., personal experience vs. complete fiction) influences the lie s coherence and overall believability. For instance, when people tell fictitious stories that are renditions of their own experiences, the details of those experiences are quite vivid, well structured, and logically consistent. This makes for a very compelling and convincing lie (DePaulo et al., 2003). However, when lies are borrowed from another s experiences or simply fabricated, they tend to be less detailed and consistent. As a result, these lies are more easily detected (e.g., Smith, 1998). Consequently, it appears that although deceivers make an effort to tell convincing stories, there are times when they slip up and leave cues indicative of lying.

B. Perceivers are Biased to Believe Others

Even though deceivers obviously want to tell plausible stories that do not arouse suspicion, sometimes even flawed stories go undetected. One reason for this is that people use heuristics, or mental shortcuts that allow them to reduce the amount of information that needs to be processed (Kahneman, 2003). That is, because people are processing and making judgments on several levels (e.g., comprehending the argument and judging whether or not it is deceptive), it is possible that people use heuristics to shortcut the deception judgment, in order to dedicate more attention to comprehending the message. For instance, to focus more on the main thrust of another s argument, a person might start with the assumption that the communicator is truthful, thereby blurring the deception judgment and allowing the communicator to get away with the lie. Furthermore, if the communicator is conveying beliefs that the person happens to agree with, then the individual might be even more likely to shortcut the deception judgment process.

While the use of heuristics is advantageous in the sense that they are quick and efficient, the drawback is that they are also prone to error. When the heuristics people use are subject to error, they are often referred to as biases. Three types of heuristic biases that seem directly applicable to deception detection are the truthful bias, demeanor bias, and belief bias.

1. Truthful Bias

Given that one of the most accepted social norms is for people to be truthful (Grice, 1989), people interact with others under the assumption that they will be

forthcoming and honest. However, just because people want to believe that others will be honest does not mean that this is necessarily the case. In reality, people lie frequently. For instance, in one diary study, DePaulo et al. (1996) found that people admitted lying 1-2 times per day.

Regardless of the frequency with which people lie, however, perceivers tend to assume that communicators are truthful. And because perceivers assume communicators to be truthful, this makes them especially prone to misjudging communicators false propositions as true. As a result, whenever perceivers presumptively assume communicators propositions as true, it is said that they have a truthful bias.

One reason why people tend to believe communicators propositions is because they may be hard-wired to first believe and then unbelieve (Gilbert 2002, 1991). That is, according to Gilbert s Spinozian hypothesis, acceptance is a passive and inevitable act, whereas rejection is an active operation that undoes the initial acceptance. Acceptance coincides with comprehension: in order to comprehend an assertion, one must also accept it.

Relevant to the present discussion, this means that lies must first be perceived as truths until enough evidence presents itself for these truths to be deemed untrue. When used heuristically, this means that people s default option or hypothesis might be to believe others claims as true. Of course, this does not mean that people must always accept others propositions as true. Indeed, it is possible to detect lies. However, such deception detection requires more effortful processing. For instance, to deem one s claim as true, one simply needs to comprehend the statement. However, to deem it as false, the

perceiver must first accept the communicator s deception as true before it can be questioned and subsequently reclassified as untrue.

Evidence for this hypothesis comes from a study (Gilbert, Krull, & Malone, 1990) in which participants were asked to assess the veracity of a set of propositions. After each proposition was presented, a message followed indicating whether the proposition was true or false. In addition, during the experiment participants were asked to press a button whenever they heard a tone (a task used to distract them). According to Gilbert s Spinozian hypothesis, an interruption would prevent participants from unbelieving the statements they comprehended (i.e., believe the false propositions as true) but would not cause the true propositions to be reported as false. And this was exactly what they found. When uninterrupted, participants correctly identified true statements as true and false statements as false. However, when interrupted, participants were more likely to accept the false statements as true and true statements as true.

2. Demeanor Bias

Another bias related to deception detection is the demeanor bias. This bias differs from the truthful bias in that one does not believe that everyone is truthful. Instead, only those who appear honest are perceived as honest. For example, in one study, people were asked to tell one lie and one truthful statement about what they did in their last job as they were videotaped. Later, judges were then asked to watch the videotapes and rate whether the person was lying or not. In 50% of the cases that judges watched (i.e., 17 out of 34 truth/lie paired stimuli), 66% of the perceivers agreed that 10 candidates looked honest and 7 dishonest, where those who looked honest were judged as honest and those who looked dishonest were judged as dishonest. However, because each participant in the

study told one truth and one lie, a perfectly detected candidate would have been judged as honest one time and dishonest another (Bond et al., 1985). In other words, how the speaker "looked" had more of an influence on the perceiver's judgment than the actual statement itself.

3. Belief Bias

In contrast to the argument that people judge others as truthful or deceptive based on their appearance, another reason why deception may go undetected is because of people's belief biases. According to Gilovich (1991), "people tend to see in a body of evidence what they expect to see. What people expect to see, furthermore, is often what they want to see, and so the biasing effect on their preconceptions is often exacerbated by the biasing effect of their preferences and motives." Relevant to detecting deception, when perceivers interact with deceptive communicators who make arguments in accordance with the perceivers' beliefs, the perceivers may be more likely to heuristically process this information as true because they are hearing what they want to hear.

Of course, the belief bias does not imply that people always make decisions based on their beliefs and preconceptions, nor does it mean that they simply ignore information that contradicts them. Sometimes the evidence contrary to people's beliefs is so potent that they have no choice but to acknowledge it (Gilovich, 1991).

Nonetheless, being that people's expectations, preconceptions, and beliefs often drive their behavior, the trend is generally that their thresholds for what constitutes "evidence" varies in a way that corresponds with their expectations. That is, if a person is lying in a way that confirms what one wants to hear, then he or she may be more likely to accept those statements as true.

When processing ambiguous information, how people deal with the information is straightforward: they interpret information in a way that fits their preconceptions (Pronin, Puccio, & Ross, 2002; Hamilton & Mineo, 1998). Evidence for this comes from a study (Maoz, Ward, Katz, & Ross, 2000), where Arab and Israeli students were asked to read peace proposals offered by both Israelis and Palestinians. Although the authors asked participants to read both proposals, the authors varied the purported authorship of the proposals (i.e., the peace proposal constructed by Palestinians was purportedly written by Israelis and the peace proposal constructed by Israelis was purportedly written by Palestinians). It was found that the identity of the person who was believed to have authored the document had more of an impact than the actual author: If an Israeli was believed to have authored the proposal, then Arabs thought it was biased against the Palestinians; whereas if a Palestinian was believed to have authored the proposal, then Israelis thought it was biased against Israel (even though the proposal was, in fact, authored by a person on their side of the debate). Consequently, when dealing with ambiguous information, it appears that what one believes has an influence on one s perception of what is. In the context of lying, it appears that if a perceiver wants to believe a deceiver s argument is true (perhaps because the deceiver is making ideological arguments that are congruent with the perceiver s beliefs) then he or she will most likely deem it to be true.

However, when the information at hand becomes unambiguous, the way in which an individual processes that information strongly depends upon whether that information supports or refutes the individual s beliefs. When the unambiguous information supports their beliefs, it is handled similarly to the way they would handle ambiguous information:

the information is readily accepted and receives little scrutiny. When the unambiguous information refutes their beliefs, however, the evidence is scrutinized and disputed to a larger degree (Gilovich, 1991).

In the context of lying, it appears that when questioning the veracity of another s statement, what we will conclude (lie/no lie) is partly determined by what we want to believe. For example, if people want to believe that abortion is immoral, then they may be willing to buy into all sorts of deceptive arguments purporting the factual ills of abortion. However, if they want to believe that abortion is moral and necessary, then they will most likely scrutinize the cited evidence, increasing the probability they will detect the communicator s lies.

C. Perceivers are Unmotivated to Detect Another s Lies

Aside from believing that others are truthful simply because they appear truthful, or believing that others claims are true because they fit with one s ideological beliefs, another major reason why deception may go undetected is because of perceivers motivation level. That is, if people are simply unmotivated to detect another s deception, then it is likely that such deception will be detected.

One factor that affects people s motivation is their need for closure (Kruglanski & Webster, 1996; Kruglanski, 1990). Some people are motivated to seek closure on an issue by seeking a solution to a question, while others are motivated to keep the issue open in order to continue exploring for a suitable answer. According to Kruglanski (1990), people who seek closure are more impulsive, process less information, and leap to conclusions based on inconclusive evidence, whereas people who accept nonclosure are more tolerant

of ambiguity and wait until they have more information in order to make a more informed decision.

According to Kruglanski (1990), people s need for closure is affected by demands stemming from the situation. For instance, when pressured by situational demands like time deadlines, people are forced to make decisions without having effectively weighed all of the relevant factors inherent in the decision because they need to find a solution before the deadline. As a result, when dealing with time constraints, people are often forced to prematurely close the issue and make a decision. In contrast, when situational demands require that people be held accountable for their decisions, they are more likely to take their time and find the best solution (Tetlock, 1985).

In addition to situational factors, personality factors also affect one s need for closure. Specifically, because some people have a difficult time dealing with ambiguity, oftentimes they seek out an immediate solution to a problem. Two reasons for this are: (a) they want to reduce their information processing demands and/or (b) they prefer to have concrete solutions. When personalities demand a high need for closure, people are motivated to seize and freeze information (i.e., they find a solution and declare that to be the universal solution). As a result, people with a high need for closure have a greater sense of urgency and permanence in the solutions to their problems.

The implications for this in the context of lying is that when people are motivated by a high need for closure to resolve the question of whether someone is lying or not, they may less motivated to process all of the information that might lead to detecting another s deception. However, when people have a lower need for closure, they may be

more motivated to take their time and explore the validity of another s claims. This latter strategy (i.e., having a low need for
closure) should make people more likely to notice logical inconsistencies in another s statements, thereby making them more likely to explore and subsequently detect another s deception.

D. Perceivers Often Rely on Inappropriate Cues

Based on the last section, the use of heuristics supports unsuccessful deception detection. However, even when people engage in more effortful processing, it is still possible for them to unsuccessfully detect another s deception. One reason for this is because (as shown previously) people rely on inappropriate cues when judging deception. That is, since they process the wrong information, they incorrectly conclude that the person did not lie (Forrest, Feldman, & Tyler, in press).

For the most part, when judging deception, people have two mutually exclusive hypotheses: (1) the person lied or (2) the person did not lie. And because people often rely on inappropriate cues (e.g., eye contact), it is possible that people find an overwhelming amount of evidence to support the did not lie , as opposed to the did lie hypothesis, leading to erroneous and overconfident judgments.

CHAPTER V

LIE DETECTION STAGES AND PROCESSES

The previous sections provide insight as to why deception is difficult to detect. However, the goal is to focus on improving deception detection. Before we can overcome these limitations and improve our deception detection abilities, it is important to first understand what the deception detection process looks like.

Although it could be argued that most forms of deception detection judgments are processed heuristically, even when people are motivated to go through a more effortful processing strategy in order to detect another s lies the deception detection literature has largely conceptualized this as a one-step process: people receive and interpret others statement either as true or false. However, it seems reasonable that effortful deception detection is more of a sequential process where people first become suspicious of another s statements after which they explore the truthfulness underlying these claims.

With respect to this section, the main argument is as follows: before a person can detect another s deception, that person must first suspect that the other s statement is untrue. Once the person becomes suspicious, an assessment of the veracity of the deceiver s claim ensues by checking the statement against other evidence. Once checked (and either confirmed or disconfirmed), if deemed false, a decision (based on an assessment of the deceiver s motives and intentions) must then be made as to whether the deceiver lied or not. If the statement is deemed a lie, the person must then decide what action to take regarding the deception, where an attribution of the deceiver s motives might also influence the action taken in response to the deception.

A. Becoming Suspicious

Although there is a great deal of evidence that supports the fact that people often fail to detect another s deception, other evidence points to the fact that people are not always duped. In fact, research has shown that people are more suspicious of deceptive statements than truthful ones (e.g., Stiff, Kim, & Ramesh, 1992; DePaulo, LeMay, & Epstein, 1991; DePaulo, Rosenthal, Green, & Rosenkrantz, 1982). For example, in one study (DePaulo et al., 1982), participants were asked to honestly and dishonestly describe persons they liked and disliked (i.e., some were honestly described as likeable, some dislikeable; whereas some were dishonestly described as likeable, some dislikeable). When observers of these statements were asked to rate the speaker s honesty, it was found that the untruthful messages were perceived as more deceptive than truthful messages.

One major factor that seems to influence a person s suspicion of another s claim is the perceiver s knowledge and experience in that particular domain (Ernhardt, Scarr, & Geneson, 1993). For instance, in a case involving academic fraud (Sprague, 1993), a research scientist involved in biomedical research funded by the NIMH claimed he had conducted a longitudinal study which lasted for 2 years *after* had resigned from the research center. Because the data were very compelling, they aroused little suspicion in the eyes of the NIMH and the university. However, because this researcher had worked closely with another colleague, when the colleague read the report, he knew that this could not have been true, since this researcher had not once returned to the research center since his departure years earlier.

In this case, because the majority of people did not have access to this knowledge, the researcher s deception would have failed to arouse suspicion in the eyes of many. However, because this one individual had knowledge in that particular domain, his suspicion was aroused and later confirmed after some investigating.

Although having factual knowledge about a topic is one way to become suspicious of another s deception, suspicion of the veracity of another s claims can be initiated through others means as well. For instance, using appropriate verbal and nonverbal cues, being motivated to catch the liar, and having the ability to notice the plausibility (or implausibility) of the deceiver s story are effective ways to ensure that a deceiver s lies don t go unnoticed.

Nonetheless, based on the findings cited here and earlier, it appears that when forced to make a clear dichotomous decision about whether a person is lying or not, people are not very accurate. However, because people correctly suspect that dishonest statements are less sincere than honest statements, there does appear to be some intuitive suspicion that the deceptive communicators are not being just that: deceptive. This suspicion can be enhanced by many factors, including the expertise and experience one has within a particular domain.

Because people can become suspicious of, but not necessarily detect, another s deception, it appears that to accurately detect deception one must go through additional steps to explore this detect deception an issue that we will turn to next.

B. Searching for Evidence: Checking the Statement Against Other Evidence

Once people are suspicious of another s claims, they must begin to explore the veracity of another s claims by checking the statement against other evidence. However, how one goes about verifying another s claims depends upon the type of lie being told.

There are several ways to verify a person s claims, with some claims being easier to prove than others. For instance, fact-based lies -- like an insurance claim on a broken leg, an employee s attendance record, or a person s criminal record -- are relatively easy to verify since one could check information databases, question third parties, or request that the deceiver provide proof in order to verify the authenticity of a claim. Belief-based lies -- like a person s purported level of extraversion, beliefs about political issues, or a parent s parenting style -- on the other hand, can be more difficult to authenticate. For example, to verify a person s political beliefs, one could ask the person for clarification concerning his or her claims, consult with one of the person s close confidants, or construct some sort of instrument (e.g., a political belief scale). However, what counts as proof for belief-based lies is more ambiguous than fact-based lies.

According to DePaulo, Kashy, Kirkendol, Wyer, & Epstein (1996), three types of belief-based lies are lies about feelings (e.g., I told her the muffins were the best ever), lies about future plans (e.g., I said I would go out with him sometime but I won t), and lies about explanations and reasons for their behavior (e.g., I told him I didn t take out the garbage because I didn t know where to take it). In contrast, three types of fact-based lies are lies about events, people, or possessions (e.g., I told him my father was an ambassador), lies about actions or whereabouts (e.g., I told him I went out with my

friends when I was really on another date), and lies about achievement or knowledge (e.g., I told him I aced the final exam when I really got a D).

Clearly, in these cases, belief-based lies are more difficult to verify than the fact-based lies. After all, it would be quite difficult for someone to prove how another feels about muffins, what one s future intentions are, and whether one does or does not know where to take out the garbage, but easier to verify a parent s occupation, what one did on a particular day, and how one performed on a test.

As a result, it appears that how one verifies another s claims depends upon the type of lie told (e.g., fact versus belief-based). For instance, if the lie was factually based then the person could verify the claim by searching for concrete information that would corroborate the claims. However, if the lies were belief-based, then the person would have to use other methods in order to substantiate the claims (e.g., ask for third party verification). However, even if a person s investigation provided proof that the statement was factually incorrect, this still does not necessarily mean that the person had lied because it is possible that the person had accidentally misstated his or her claim. As a result, it appears that once a statement has been deemed factually false, the person must then decide whether the person had lied.

C. Attributing Motives: Deciding that the Statement is Deceptive

Up to this point, we have only discussed how perceivers of deception process information to prove a lie s factual falsity. However, in order to classify a statement as a lie, the person making the false statement must (a) be aware of the statement s falsity and (b) intend to deceive/mislead. This is an important distinction because a person who unwittingly misstates something is not guilty of anything other than making an error or,

at worst, being ignorant. In addition, a person who suspects that the statement could be false but stated it anyway with no intent to mislead, is not lying at worst, they could be deemed irresponsible or reckless but certainly not deceitful. In contrast, a person who knew full well that the statement was untrue and knew that it would be misleading is indeed lying.

But to determine both a person s knowledge and intent is difficult, if not nearly impossible. In order to determine if a person is lying, the person making the intent judgment must draw inferences about a speaker s motives on the basis of circumstantial evidence (Peterson, 1995). Certainly this is no simple task, not to mention significantly prone to error. To determine knowledge and intent, people must rely on their own judgment, which (as discussed earlier) is prone to a wide array of biases. Furthermore, because the judgments people make about another s intent will be primarily (if not solely) based on indirect evidence, they are also forced to make assumptions about the person assumptions that may not be warranted. Nevertheless, one must make decisions about whether or not he or she believes that another is lying. If deemed a liar, then one must decide what to do about the deception an issue we will consider next.

D. Deciding What to Do About the Deception

If a person is found to have engaged in deception, the next step is for the perceiver to decide what to do about it. Being that there is an implicit level of trust that people share with others, they expect people to be honest with them. Lies violate this trust, and people deem most lies be totally unacceptable (Gialcone & Pollard, 1990). But, of course, there are some exceptions (Feldman et al., 2000). One factor that seems

to be important in determining the acceptability of lies is motive (Seiter, Bruschke, & Bai, 2002).

Determining a person s motives for deception is important because it influences what one will decide to do about the deception. For example, lying to protect another s feelings (e.g., you look really good in that dress) will carry fewer repercussions than self-serving lies (e.g., I told you that I didn t know how to work the washing machine because I wanted you to do it for me).

Motives range from altruistic to individualistic to exploitative (Lindskold & Walter, 1983). That is, who stands to benefit from the lie (self or other), the extent to which the lie is harmful (physical or psychological), and the extent to which lies are exploitative (taking advantage of another for selfish gain) are all issues that the perceiver contends with when determining the proper course of actions to take in light of deceitful revelations (Korn, 1987; Lindskold & Walter, 1983).

One survey (Seiter et al, 2002) composed of 54 different deceptive scenarios that cut across 9 types of deceptive behaviors indicated that lying for reasons of affiliation, benefiting others, privacy, and conflict avoidance are the most acceptable motives for lying. Alternatively, lying for reasons of impression management, benefiting self without harming others, benefiting self with harming others, and malice are the least acceptable motives for lying.

Once the person s motives for the deception are assessed, they must then decide upon an appropriate form of punishment (if any). Although the actions one can take in reaction to another s lies depends upon the situation (e.g., incarceration for fraud versus divorce for infidelity), to date no research has attempted to create a general taxonomy of

the actions one might take in light of detecting another s deception. However, in general, four types of punishment are: physical punishment (e.g., incarceration, physical beatings), social alienation (e.g., lose friends/lovers, ban from profession), emotional punishment (e.g., expression of disappointment in another s actions), and verbal warnings (e.g., don t do it again).

CHAPTER VI

RESEARCH STUDIES

The primary argument thus far has been that perceivers go through multiple steps in order to detect deception. Although empirical evidence indirectly supports this model, no research to date has directly addressed it. To directly address this question, three studies were conducted.

To help focus the research questions, all 3 studies examined deception within the job interview context. The first study examined the types of information perceivers use to distinguish candidates lies from non-lies. That is, the proposed framework says that people first become suspicious, then search for evidence, and then motives before making a deception judgment decision. However, before this order can be empirically established, we must first demonstrate that these types of information (suspicion, fact, and motive) are indeed relevant and useful to perceivers when judging deception.

With the relevant types of information used in this process established, the second study then examined how this information is weighed and utilized in the deception judgment process.

Finally, with a better understanding of what types of information are used and how they are used, the third study examined the order in which perceivers tend to process information when detecting candidate deception.

A. Study 1 Distinguishing lies from non-lies: Understanding the parameters of what constitutes deception

1. Overview

The purpose of this study was to examine how perceivers distinguish candidate lies from non-lies. It was hypothesized that perceivers would be most suspicious of another s deception when there was information that (a) generated a level of suspicion (e.g., noticing a logical implausibility in the candidate s statement), (b) provided evidence that the deception occurred, or (c) offered a motive for why the deception occurred.

Additionally, it was hypothesized that participants would be most certain of candidate deception when they found information that (a) allowed the perceiver to become suspicious of another s deception, (b) provided evidence that deception occurred, and (c) offered a motive for why the deception occurred.

In other words, it was hypothesized that perceivers would become suspicious of a candidate s deception when at least one piece of evidence (e.g., suspicion, fact, or motive) was known. However, perceivers would only be certain of the deception when all 3 (i.e., suspicion, fact, and motive) were known.

2. Method

a. Participants

One-hundred twenty six participants were recruited for this study. Participants were students from a large state university, taken from the psychology participant pool. All participants were given course credit for their participation.

b. Independent Variables

i. Becoming Suspicious. All participants read a scenario involving a job candidate who was suspected of lying during a job interview. In the suspicion condition, participants were provided with information arousing suspicion that the candidate lied (e.g., the candidate claimed to have sold $180,000 worth of products in only two hours, which is very rare for this type of sale). In contrast, in the no suspicion condition, participants were provided with information not arousing suspicion that the candidate lied (e.g., the fact that the candidate sold $180,000 was quite impressive).

ii. Evidence for Deception. In the evidence condition, participants were given information describing what evidence was available to explain the candidate s deception (e.g., after having an off-the-record conversation with the candidate s client, it was found that the candidate s colleague, not the candidate, actually made the $180,000 sale). In contrast, in the no evidence condition, participants were given information that did not offer any evidence to support the claim that this candidate lied (e.g., after having an off-the-record conversation with the candidate s client, it was found that the client did purchase $180,000 worth of products from the candidate s former employer).

iii. Motive for Deception. In the motive condition, participants were given information that served as a plausible explanation for the deception (e.g., the candidate was recently fired from his old job). In contrast, in the no motive condition, participants were given information that did not serve as a plausible explanation for the deception (e.g., the candidate is happy in his current job but would consider a job change because it would be a good career move).

c. Dependent Measures

Three questions were composed to represent each measure of the two dependent variables (i.e., suspiciousness, lying). In addition, all questions were anchored on a 7pt. scale.

i. Suspiciousness. Participants were asked to rate their agreement with the following statements: (a) I suspect this person had lied about the sale of those units to company x (b) I think this person is being honest and (c) I question this person s honesty about actually making the sale. Reliability for this measure was .88.

ii. Lying. Participants were asked a series of questions regarding their beliefs about whether the deceiver had indeed lied. Specifically, participants were asked to rate their agreement with the following statements, (a) I know this person lied about making that sale (b) I am positive this person lied about making that sale , and (c) Without a doubt, this person was truthful. Reliability for this measure was .80.

d. Procedure

At the onset of the study, participants were asked to read a short scenario involving a job candidate who may have lied during a job interview. Because there were 3 independent variables used in this study (i.e., suspicion, evidence, and motive), the story itself varied depending on which of the eight conditions participants were assigned to. (For complete narratives, see Appendix A.) Once participants finished reading one of the eight stories, they rated the extent to which they were suspicious of the person s deception and the extent to which they knew the person was deceptive.

3. Results and Discussion

To determine whether participants distinguished between suspecting a lie and being certain of it, a t-test was conducted comparing how suspicious participants were of the deception to how certain they were of it. Not surprisingly, it was found that participants were more suspicious (M=4.56) of the candidate s deception than certain of it (M=3.89), t (126) = 6.47, $p < .000$. This lends credibility to the fact that people distinguish what they believe to be true from what they know to be true.

a. Suspiciousness

A 2 (evidence) x 2 (motive) x 2 (plausibility) three-way between subjects analysis of variance was conducted on participants combined suspiciousness ratings. In terms of suspecting deception, participants were more suspicious of the candidate s deception when there was evidence (M = 5.49) for the deception compared to when there was no evidence (M = 3.87), F (1,118) =58.221, $p<.000$; and more suspicious of the candidate s deception when there was motive (M = 5.03) for the deception compared to when there was no motive (M = 4.33) for the deception, F (1,118) = 10.96, $p<.001$. Additionally, participants were not affected by whether there was a logical implausibility in the candidate s story or not, F (1,118) = 1.83, ns. (No interactions among the three independent variables were significant.) A summary of the results can be found in Figure 1.

b. Lying

A 2 (evidence) x 2 (motive) x 2 (plausibility) three-way between subjects analysis of variance was conducted on participants combined lying ratings. In terms of being certain of deception, participants were more certain of the candidate s deception when

there was evidence (M = 4.61) for the deception compared to when there was no evidence (M = 3.16), t (124) =6.205, p<.000. However, participants certainty of the deception was not affected by the logical implausibility of the candidate s story, t = (124), -1.13, ns. In addition, participants certainty was not affected by the candidate s motive for the deception (M = 5.03) for the deception, t (124) = 1.503, ns. A summary of the results can be found in Figure 2.

When considered together, these findings show that participants were suspicious of the candidate s deception when there was motive or factual evidence that the candidate lied. However, participants were only certain of the deception when there was factual evidence proving the untruthfulness of the candidate s statements.

Based on the results from study 1, partial evidence was found to support the model. That is, it was found that evidence and motive were instrumental in allowing perceivers to distinguish lies from non-lies. However, the role that becoming suspicious (or in this case, the statement s plausibility) plays in the deception judgment process is unclear. Although it is apparent that this information does not influence the lie/no lie judgment outcome, it is possible that it plays some other role, such as acting as a trigger for the deception judgment process (e.g., giving perceivers a reason to explore whether deception occurred) or giving perceivers confidence regarding the accuracy of their decision. As a result, study 2 manipulated suspicion by itself to examine whether becoming suspicious is used in the deception judgment process.

B. Study 2 Weighing the importance of personality, suspicion, facts, and motive in the deception judgment process

1. Overview

The present study had two primary goals: the first being to examine how perceivers weigh various factors when deciding whether someone did or did not lie, and the second being to examine how personality characteristics affect perceiver s abilities to judge a candidate s deception.

It was hypothesized that suspicion would be important and influential in the deception judgment process such that participants will (a) use this information when forming a lie/no lie judgment and (b) be more certain of another s deception when there was information that focused (suspicion), proved (evidence), and explained (motive) the deception.

In addition to understanding how people weigh and use various forms of information when distinguishing lies from non-lies, a variety of personality differences might also help enlighten how the deception judgment process functions. Two characteristics that might affect the deception judgment process are their trusting and need for closure.

Trust in others is an important characteristic to understand within the deception judgment process because of the potential implications involving how different types of perceivers might define each step of the process. For instance, because individuals with a high trust in others tend to believe in the general goodness and trustworthiness of others, one might say that they have an innocent until proven guilty approach to judging

candidate deception, compared to individuals with a low trust in others who tend to have a guilty until proven innocent approach to judging candidate deception.

Because of this innocent until proven guilty philosophy, perceivers with a high trust in others will want and need indisputable evidence proving the deception and as such will demand a great deal of information before agreeing that another could be, would be, and/or is lying. Based on this, it is hypothesized that individuals with a high trust in others will be less certain of another s deception, relative to those with a low trust in others because the high trusters will want more evidence confirming the deception before such a judgment is made.

In addition to trust in others, need for closure is also an important characteristic in helping to understand the deception judgment process. This is due to the implications regarding how quickly a person will progress through each step of the deception judgment process. For instance, unlike individuals with a high need for closure, individuals with a low need for closure are comfortable with ambiguity and refrain from resolving an issue until they are confident that they have found the best answer. In the context of judging deception, individuals with a low need for closure will also delay making a judgment regarding whether one has lied or not simply because they want to be certain that they are making the right decision. As a result, it is hypothesized that people with a low need for closure will be less certain of another s deception because they will be eager to learn more about the situation before making a final decision, whereas individuals with a high need for closure will be more certain of the deception because of their need for problem resolution and closure.

2. Method

a. Participants

Sixty participants were involved in this study. Participants were students from a large state university, taken from the psychology and business school participant pool. All participants were given course credit for their participation.

b. Independent Variables

i. Becoming Suspicious. In the suspicion condition, participants read a scenario involving a job candidate who was suspected to have lied during a job interview (e.g., the job candidate claimed to have sold $180,000 worth of products in only two hours, which is very rare for this type of sale). In contrast, in the no suspicion condition, participants read a scenario involving a job candidate who was not suspected of lying (e.g., the fact that the candidate sold $180,000 was quite impressive).

c. Additional Information

To complete the scenarios, participants were given additional information that was consistent across conditions. They were as follows:

i. Evidence for Deception. Participants were given information that described how the deception occurred and what evidence was available to explain it (e.g., after having an off-the-record conversation with the candidate s client, it was found that the candidate s colleague, not the candidate, actually made the $180,000 sale).

ii. Motive for Deception. Participants were given information that explains why the deception occurred (e.g., the candidate was recently fired by his previous employer).

d. Personality Measures

i. Trust in Others. The Trust in Others (Longwell & Thompson, 1997) scale was used to measure people s truthful bias.

ii. Need for Closure Scales. The Need for Closure (Webster & Kruglanski, 1994) scale were used to measure people s motivational bias.

e. Dependent Measures

Three questions were created to represent each measure of the two dependent variables (i.e., suspiciousness and lying). All questions were anchored on a 7pt. scale.

i. Suspiciousness. Participants were asked to rate their agreement with the following statements: (a) I suspect this person had lied about the sale of those units to company x (b) I think this person is being honest and (c) I question this person s honesty about actually making the sale . Items for the suspiciousness variable showed a reliability of .78.

ii. Lying. Participants were asked a series of questions regarding their belief that the deceiver had indeed lied. Specifically, participants were asked to rate their agreement with the following statements, (a) I know this person lied about making that sale (b) I am positive this person lied about making that sale , and (c) Without a doubt, this person was truthful . Items for the lying variable showed a reliability of .92.

iii. Weighting factors in percentages. In addition to suspicion and lying, participants were asked to report how much each of the three factors (suspicion, fact, and motive) influenced their decision. Participants were asked: What percent of your decision was based on the suspicion factor? What percent of your decision was based

on the evidence factor? and What percent of your decision was based on the motive factor? - not to exceed one-hundred percent. (see all questionnaires in Appendix B.)

f. Procedure

At the onset of the study, participants filled out the two personality measures and then read a short story involving a job candidate who might have lied. (For complete narratives, see Appendix B.) The participants task was to read the story and rate the extent to which they knew the person lied, as well as the relative importance of each factor in making their decision.

3. Results and Discussion

In terms of better understanding how becoming suspicious is used in the deception judgment process, it was found that the information used to generate perceiver suspicion did not significantly affect participants suspicion or certainty that the candidate had lied, t (60) = .39, ns and t (60) = -1.20, ns, respectively.

In terms of how participants used the various forms of information in making their decisions, however, it was found that 19.65% of their decision was influenced by the suspicion paragraph, 47.20% of their decision was influenced by the evidence paragraph, and 33.15% of their decision was influenced by the motive paragraph. This indicates that although the information used to generate suspicion did not affect the outcome of decision (i.e., certainty or suspicion that the candidate lied), this information was still considered and weighed when making the deception judgment.

In terms of group differences, it was found that participants weighed the suspicion paragraph more when there was reason to suspect deception (M = 21.55%), compared to when there was no reason to suspect deception (M = 14.84%), t (54) = 1.82, p=.07. In

addition, participants weighed the motive paragraph more when there was motive for the deception (38.36%), compared to when there was no motive for the deception (29.31%), t (54) = 2.02, $p < .05$. Finally, participants did not weigh the evidence paragraph more when there was evidence for the deception (46.8%), compared to when there was no evidence for the deception (49.13%), t (54) = .49, ns. A summary of the results are found in Figure 3.

Trust in others was not related to the degree which participants were suspicious or certain of the candidate s deception, r = .07,ns and r = -.12, ns. Furthermore, need for closure was also not related to the degree which participants were suspicious or certain of the candidate s deception, r = .13, ns and r = .18, ns.

Overall, in terms of personality differences, trust in others and need for closure did not significantly affect how suspicious or certain perceivers were when judging candidate deception.

Furthermore, it appears that the information used to generate perceiver suspicion did not affect the judgment outcome regarding perceiver suspicion or certainty of the candidate s lies. At the same time, however, this information was not ignored altogether, since this information was weighed more heavily when the information became relevant to the deception judgment. But exactly how this information was used is unknown. It seems reasonable that information, such as the implausibility of a candidate s statement could generate suspicion and therefore serve as a trigger (or initiator) for the deception judgment process. However, since this hypothesis was not directly tested by the current methodology, the only conclusion that can be drawn at this point is that this information was used.

At this point, based on studies 1 and 2, support has been found that perceivers use suspicion (statement implausibility), evidence, and motive information when judging deception. Although not directly affecting the judgment outcome, suspicion is considered within the judgment process. In addition, knowing another s motive for the deception gives perceivers a reason to suspect the individual may have lied. But only factual evidence regarding the statement s untruthfulness gives perceivers certainty regarding the statement s untruthfulness.

Based on this, it is evident that the suspicion, evidence, and motive information is relevant and useful to the deception judgment process. However, the order in which this information is processed is unknown. The order which people process and evaluate deceptive information is important because the absence of one form of evidence (e.g., the lack of motive, or a logical inconsistency) may lead to an early termination of the deception judgment process, thereby curbing the opportunity to look for other forms of evidence (e.g., facts). This may be one factor that allows deceivers to get away with their lies.

In order to assess whether this happens to be the case, an understanding of the order in which people tend to process information must first be established. As a result, this issue becomes the main focal point of the third and final study.

C. Study 3 - Model Confirmation: Examining how perceivers process deceptive and non-deceptive information

1. Overview

The purpose of this study was to examine how perceivers process candidate deception. It was hypothesized that perceivers follow four specific steps when processing this deception: (1) become suspicious, (2) search for evidence to prove statement falsity, (3) explore deceivers motives for deception, and (4) decide what to do about the deception.

2. Method

a. Participants

One-hundred and eleven participants took part in this study. Participants were students from a large state university, drawn from the psychology participant pool. All participants were given course credit for their participation.

b. Independent Variables

i. Deception. Participants were given one of two scenarios. In the deception scenario, the story described a job candidate who likely lied during a job interview. In the contrasting no deception scenario, the story described a candidate who interviewed for a job.

Participants were not provided with the complete story up front. Instead, in order to examine their information processing strategy, participants were given six folders, each which allowed them to ask specific questions (e.g., Was there evidence that the candidate lied?). Participants were allowed to select any folder they needed in order to answer whatever questions they had about the situation. The six folder options were

labeled: (a) was any reason to suspect the candidate lied?, (b) was there any evidence proving the candidate lied?, (c) was there a motive for the deception?, (d) I want to gather additional information about the company the candidate is applying to, (e) I want to examine the candidate s personal history, and (f) I want to make a decision regarding whether the candidate lied or not. (For complete narratives, see Appendix C.)

c. Dependent Measures

i. Options Selected. The primary outcome measure was the order and number of options selected.

d. Procedure

At the onset of the study, participants were asked to read one of two scenarios: in the deception scenario the candidate lied about his work experiences, whereas in the no deception scenario the candidate did not lie about his work experiences. Participants were asked to search for information to aid them in deciding whether they believed that the candidate did or did not lie.

At the onset of the study, all participants read some basic background information (e.g., what job the candidate was applying for and what he had said during the interview). Once participants read the introduction, they were asked to make a decision as to what to do next (i.e., decide which folders they wanted to look in).

The order in which each option appeared in the list was counterbalanced. The study was complete once participants decided to make a judgment regarding the candidate s truthfulness.

3. Results and Discussion

The primary goal of this study was to describe the order in which people process information when evaluating deceptive versus non-deceptive statements. As a result, the main statistic used was a rank-order, descriptive statistic. That is, the order which participants selected particular folders was averaged and ranked across participants. In general, participants tended to process information in this order: (1) examined the candidate s personal history, (2) inquired to see if there was any reason to suspect that the candidate had lied, (3) gathered information about the company the candidate applied to, (4) searched for factual evidence proving that the candidate lied, (5) inquired about whether there was a motive for the deception, and then (6) made a decision regarding whether the candidate did or did not lie.

In terms of between group (lie/no lie) differences, t-tests were conducted examining differences between each of the six folders. It was found that participants in the lie condition tended to look for factual evidence earlier ($\underline{M} = 2.43$) than participants in the no lie condition ($\underline{M} = 3.08$), $\underline{t}\,(99) = -2.65$, $p<.01$. In addition, participants in the lie condition tended to make a decision sooner ($M = 4.55$) than participants in the no lie condition ($M = 5.11$), $t\,(108) = -2.54$, $p<.01$. No other significant differences were found. Table 3 provides the means and general order in which participants tended to process this information between lie/no lie conditions.

In addition to a rank-order analysis, the number of folders participants looked in (or the number of questions they asked) was examined. Overall, participants tended to look at 4.83 out of six possible folders, with gather information about the company

being applied to being the least looked at folder (i.e., only 86% of participants looked in this folder, with all other folders being looked at no less than 96% of the time).

A significant difference was found between lie and no lie conditions, t (108) = -2.59, $p<.01$, meaning that participants in the lie condition (M = 4.55) looked at fewer folders than participants in the no lie condition (M = 5.11).

Overall, tentative evidence was found that people do process information in a particular order when making judgments regarding another s deception. Although the scope in which people process information exceeds the parameters of the proposed framework, it is consistent. It appears that in addition to checking to see if there is any reason to suspect deception, participants also preferred to gather contextual information (e.g., obtain information about the company) before examining facts and motive in order to make a decision regarding the deception.

When participants in the lie condition found evidence to suspect a lie (e.g., they looked in the check to see if there is a reason to suspect deception occurred folder and actually found a reason to suspect a lie), they became suspicious and consequently looked for factual evidence to prove the lie much sooner than when there was no evidence to imply that the candidate lied (as was the case in the no lie condition). With the factual evidence in hand, participants in the lie condition were then more likely to make a decision sooner than participants in the no lie condition.

CHAPTER VII

GENERAL DISCUSSION

When considering the three studies together, several important findings emerge. First, two key elements in judging whether the candidate lied was the availability of evidence and motive. When there was information detailing what the candidate lied about (evidence) and why he lied (motive), perceivers became more suspicious of the deception. Furthermore, when there was information specifying what the candidate lied about (evidence), perceivers became more certain of the deception.

Second, becoming suspicious was demonstrated to have played a role within the deception judgment framework. Although this information was not used in making the final lie/no lie decision, evidence shows that perceivers did not ignore this information altogether, especially as this information became more relevant to the deception judgment.

Finally, when judging candidate deception, perceivers tend to process information in a systematic fashion. Specifically, they first gathered information about the situation (e.g., obtain information about the company), before examining evidence and motive for the deception.

All-in-all, evidence was found to give general support to the proposed model. Participants tended to first look to see if there was reason to suspect deception before seeking out factual evidence to prove the statement s untruthfulness. If there was evidence to prove its untruthfulness, participants then sought out plausible motives explaining why the person might have made the false statement. Generally, participants

delayed making a final decision regarding the deception until they had acquired all this information.

In terms of how this information was used, it seems reasonable that although the suspicion (i.e., the logical implausibility) was not used as evidence to influence the participants final decision, it served as a good starting point for the participant to see if there was any reason to even suspect whether the participant had lie. That is, this information (although not damning in-and-of-itself) apparently was enough to give participants reason to want to explore the situation more thoroughly in order to know the truth.

With a reason to suspect deception, participants then searched for the factual evidence to confirm (or disconfirm) their suspicion. If confirmed, participants then sought out information regarding possible motives for the candidate s deception in order to explain why he might have lied. With all the information necessary in order to classify the statement as a lie, this led participants to make a final decision sooner than participants who had little (or no evidence) to prove the candidate lied.

In terms of how this information was used and weighed in the deception judgment process, it appears that the factual evidence was a necessary condition for proving a lie. That is, participants were more certain of deception when they had factual evidence. And without the factual evidence, participants were suspicious but not certain.

In contrast to evidence as being a necessary condition, suspicion (i.e., logical implausibility) and motive played more of a supplemental role in the process it gave participants confidence in the accuracy of their decision when there was factual evidence indicating the statement s untruthfulness.

A. Research Limitations

Although the information found in the three studies is encouraging, some limitations should be mentioned. With respect to the first study, although it was demonstrated that there was a difference between suspecting a candidate lied and knowing a candidate lied, how exactly that translates into a lie/no lie decision is unknown. For instance, in the real world, perceivers must make a dichotomous decision about whether a person lied or not, and soon after decide what to do about it, if anything. However, in the first study, the results were put on a continuous scale where it was unknown how a person s suspicion or certainty translates into a did lie or did not lie decision. Future research should focus on better understanding the relationship between suspicion and certainty, how they are translated into a lie/no lie decision, and how that decision ultimately affects behavior.

With respect to the second study, although the second study documented that perceivers use becoming suspicious information as an aid in making judgments about candidate deception, how this information is used is unclear. For instance, it is unknown if this information is used as a prompt to initiate the deception judgment process (as it is theorized) or whether it is used for another purpose, such as giving perceivers confidence regarding the accuracy of their decision. A more rigorous study should be designed to address this question.

In terms of the personality findings, trust in others and need for closure were not found to significantly influence perceivers suspicion or certainty of another s lies. With respect to trust in others, in retrospect this may not be all that surprising. Regardless of one s bias to trust others, it is difficult to ignore an overwhelming amount of evidence

that implies someone lied. As a result, even though certain individuals might have wanted to trust others, the evidence in the scenario was so substantial that perhaps even they were forced to admit that this candidate was deceptive.

The findings with respect to need for closure, on the other hand, were a bit surprising. Since individuals with a high need for closure tend to make quick decisions in order to have closure on the issue, it makes sense that the individuals with a high need for closure would be more certain of the deception, so that the issue could be considered closed in their mind. This, however, may be faulty hypothesis logic. After all, implicit in the hypothesis was the assumption that the issue was not closed until the participant judged the candidate to be deceptive. In reality, it is possible that some participants perceived the candidate as truthful and therefore were not certain of the deception, but instead were certain of the accuracy of their decision. If this were the case, then the participants would have considered the decision closed just not deceptive. As a result, this would have attenuated the correlation between the participant s need for closure and suspicion/certainty of deception.

Alternatively, the problem with the lack of a significant relationship between need for closure and suspicion may have had more to do with the research design than the hypothesis. Because only becoming suspicious was manipulated, there was a substantial amount of evidence implying the candidate lied across both conditions. This may have led to rather high ratings regarding both the suspicion and certainty of the candidate s deception, neutralizing any effect need for closure might have had on participants judgment processes. Future research should attempt to address these

concerns by teasing apart the certainty of the decision from the certainty of the deception, and creating a scenario where there is little evidence implying that deception occurred.

With respect to the third study, although evidence was found regarding the order in which perceivers process information when judging deception, a similar pattern was also found when processing non-deceptive information. However, a key similarity between the two studies was that both sets of participants were asked to determine if the candidate lied or not. It is possible that these instructions started the deception judgment process, and therefore both conditions (although containing different information) involved the deception judgment process (i.e., both were evaluating lies, only that one story contained a lie and the other did not). Future research could examine this by creating conditions in which one situation initiates the deception judgment process (e.g., ask perceivers to determine if a person lied or not), with the other situation focusing on something else (e.g., asking perceivers to read a story and evaluate the candidate s job-fit).

In addition to the study-specific limitations listed above, these findings must also be weighed against how people process and perceive deception across cultures. It is possible, for example, that in western cultures perceivers tend to place a heavy emphasis on the what (evidence) and why (motive) regarding deception, whereas in non-western cultures the emphasis might only rest on the what (evidence) regarding deception. If that were the case, it would imply that what constitutes deception varies across cultures. Such findings would allow us to begin to understand how deception is perceived, interpreted, and evaluated across cultures. Such investigations could lead to new insights regarding how we can become more adept at detecting deception.

B. Future Directions

While general support was found for the proposed model, at the same time, it is evident that the model needs some significant additions. For instance, if the situation is foreign to perceivers, they will first attempt to gather this type of information since it would allow them to better understand what the deceiver could be lying about and why. In fact, contextual understanding may even be a necessary condition in order to accurately detect deception.

Outside of the specific findings, it is also evident that the model needs to be able to account for a variety of moderators that could also affect the deception judgment process. For instance, perceivers mental abilities could influence their abilities to suspect and judge deception (the can do part of their personality). In addition, perceivers motivations (e.g., need for closure) could affect their willingness to seek out and carefully consider all forms of evidence available to help make accurate deception judgments (the will do part of their personality). Also, perceivers biases, such as their liking of the deceiver might affect their desire to detect deception (the want to part of their personality). And finally, factors outside of the perceiver may affect their abilities to detect deception (e.g., the deceiver s ability to tell an effective and convincing lie undoubtedly affects the perceivers ability to detect the lie).

On a final note, the present studies contribute to our understanding of the deception judgment process in several ways. First, they suggest that people examine multiple forms of evidence in order to make a decision regarding another s deception. And second, they suggest that people process information systematically when judging deception. Such research is important because it provides insight into how perceivers

think when judging deception. This serves as a good starting point for understanding when and where people err in the deception judgment process, and how these errors can be eliminated (or dealt with).

C. Applied Implications

The present model and corresponding research have several implications regarding the detection of deception in the real world. When considered in the job-interview context, in the simplest sense, the model speaks for the need to refrain from making quick decisions and gather the necessary information about the candidates.

In terms of how employers might become suspicious, this involves obtaining an understanding of the situation, including who the candidates are, what experiences they have had, and what education they have received. Having this type of information will help managers be more critical of the examples candidates provide in the interview. Although the current results suggest that this will not allow the managers to directly detect deception it will prompt them to search for more information, thereby improving their chances of locating evidence that proves the statement to be untrue.

The model also indicates that assessing the candidate s motive has some value. An understanding of the candidate s current employment needs (e.g., having little experience, or being unhappy in one s current position) may provide insight into their level of desperation - which may be a good indication of their willingness to lie. Again, although this may not directly lead to better detection of deception, it may generate sufficient suspicion to prompt the manager to further explore the veracity of the candidate s statement.

In contrast to obtaining candidate s personal histories and assessing motives, when it comes to evaluating evidence, the model indicates that managers should seek out information that is verifiable. Because evidence is a necessary (and in some cases a sufficient) factor in determining a candidate s deceptiveness, the manager will need to obtain information that can be indisputably verified as true or untrue. This means that managers will need to ask questions that will allow them to obtain such information.

What all of these suggestions speak to are a need for an interview training program designed to educate managers about the nuances of candidates deceptive behavior. The program could be a structured process, focusing on making good decisions and controlling for personal biases (such as belief and truthful biases). This would include delaying the judgment and decision-making process, asking questions in a consistent verifiable manner, actively listening to candidate responses, and asking effective follow-up questions.

The program would also include a process geared toward teaching managers how to systematically gather information prior to the interview in order to better understand the candidate s work history and current employment needs (e.g., the candidate may be more inclined to lie if he or she is currently unemployed). The program could teach managers how to ask questions during the interview that would allow them to gather information that is verifiable through particular information sources (e.g., past employers and reference sources). And finally, this information could be used as the foundation for a post-interview background check, or a psychological assessment. Of course, until further research is carried out, this remains speculative. What is clear is that managers need to be aware of the possibility of deception in order to improve the interview process.

Table 1. Conditions that distinguish lies from non-lies.

Is it a Lie?	**Condition 1 -- Made False Statement**	**Condition 2 -- Knew it was False**	**Condition 3 -- Had Intent to Deceive**
No	No	--	--
No	Yes	No	No
No	Yes	Maybe	No
Yes	Yes	Maybe	Yes
Yes	Yes	Yes	Yes

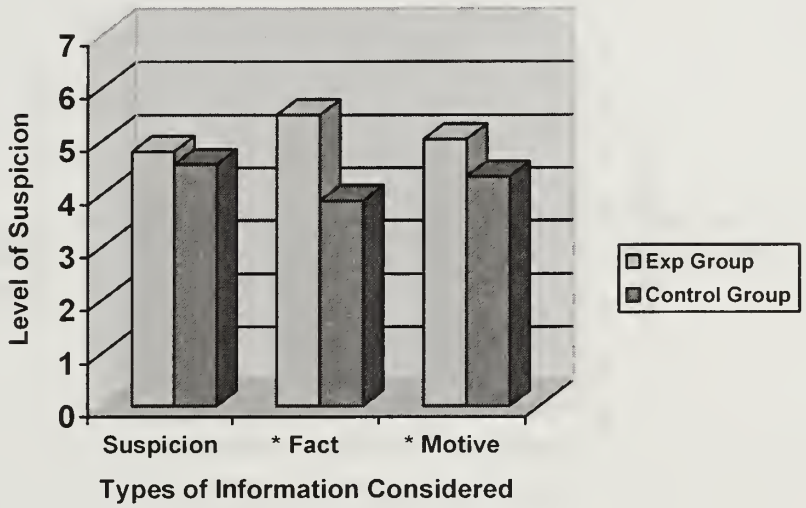
Table 2. Deceiver and Perceiver Cues Associated With Deception

	What Cues Perceivers Should Attend To	**What Cues Deceivers Provide**
Verbal Cues	Story Plausibility, Clarity, and Conciseness; Deceivers Evasive Answers	Few Details; Less Logically Structured; Less Convincing; Make Fewer Corrections to Their Stories
Nonverbal Cues	Facial Expression/Animation; Body Tension	Pupil Dilation; Body Tension

Table 3. The order in which people tend to process information.

Deceptive Candidate Scenario			**Non-Deceptive Candidate Scenario**	
Order Information Processed	Type of Information Processed	Average When Info Examined	Type of Information Processed	Average when Info Examined
1	Gather information about the company	2.25	Examine the candidate s personal history	2.18
2	Check to see if there is a reason to suspect deception occurred	2.26	Check to see if there is a reason to suspect deception occurred	2.49
3	Determine if there is proof that the candidate lied	2.43	Gather information about the company	2.53
4	Examine the candidate s personal history	2.51	Determine if there is proof that the candidate lied	3.08
5	Inquire about motive for the deception	3.15	Inquire about motive for the deception	3.11
6	Make a decision regarding the deception	4.55	Make a decision regarding the deception	5.11

Figure 1. Study 1 results showing the impact of suspicion, fact, and motive on perceiver judgments regarding suspicion of candidate deception.



* denotes $p<.05$

Figure 2. Study 1 results showing the impact of suspicion, fact, and motive on perceiver judgments regarding certainty of candidate deception.

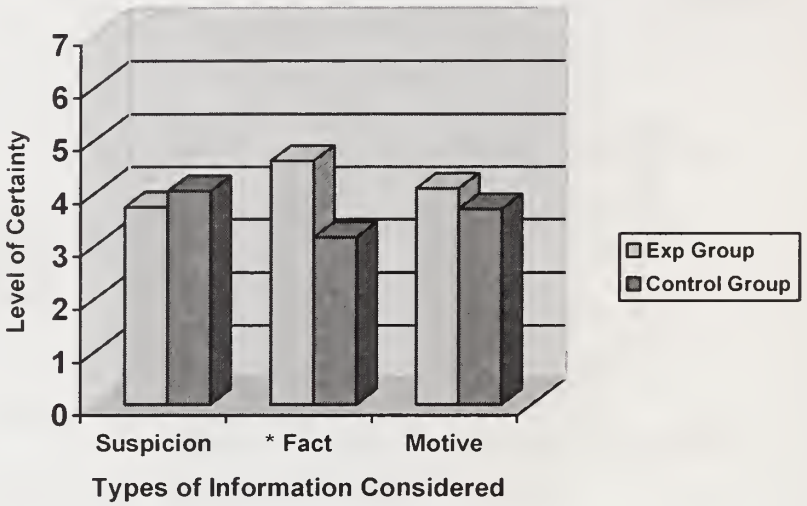


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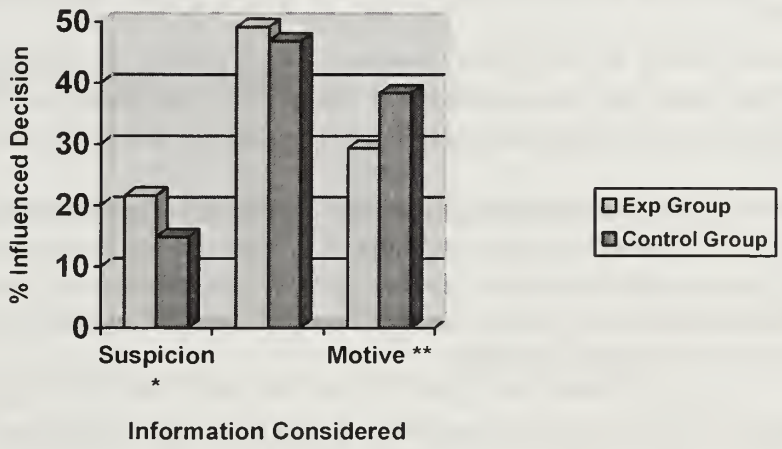
Figure 3. Study 2 results showing how people use various types of information to make deception judgment decisions.



* denotes p<.07
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APPENDIX A

COMPLETE NARRATIVES AND QUESTIONNAIRES FOR STUDY 1

Please read the following story and answer the questions below.[Ω]

Below is a story about a global company called Ropar, Inc. Based on the information provided, your task is to determine if Max - a job candidate for a sales position at Ropar - had lied to the following question (specified below) during his interview.

Ropar is a mid-size, multi-billion dollar company that specializes in computer chips. When interviewing for sales positions, it is common for Ropar interviewers to ask candidates general questions, such as "give me an example of how you build credibility with people you don't know very well" and "tell me how you have persuaded clients to buy products/services from you".

During an interview with a candidate named Max, the interviewer asked Max to provide an example of how he builds credibility with people he doesn't know very well, to which Max replied:

> I've worked in sales now for seven years and so it's not hard for me to establish credibility with customers – in fact, it's one of the things I do best. For instance, last month when I met with American Assembly [a large manufacturing company], the first thing I did was ask the client some questions around their current situation and then we talked a bit about how my company's services would be a perfect solution to their problem. It didn't take long for the client to see how much I understood their problem, my company's products, and how my solution made a lot of sense given their situation. I was only there for two hours and sold four high-speed telephony units for $180,000.

The fact that Max had seven years of experience was impressive. However, for some reason the interviewer had a gut feeling that something was wrong with his answer – after all, one telephony unit costs around $45,000, and rarely do people spend $180,000 after only two hours worth of discussion, especially without considering any other competitor bids.

After doing some fact checking on Max's background, the interviewer realized that Max indeed had seven years of sales experience, at one of the most prestigious IT companies in the country nonetheless. However, after having an off-the-record conversation with one of his friends employed at American Assembly, the interviewer found out that American Assembly had recently purchased some telephony units but it wasn't Max who sold them the units – it was a woman named Jackie.

To get a fuller perspective of Max, the interviewer decided to check Max's references. During a conversation with Max's former boss, the interviewer found out that Max was desperate to get a new job since he was fired from his job just last week. However, due to privacy issues, the former employer couldn't speak as to why Max was fired.

[Ω] (Suspicion, Fact, Motive)

To what extent do you agree with the following statements.

Question A. I suspect Max lied about his sale of four telephony units to American Assembly.

Weak suspicion	1	2	3	4	5	6	7	Strong suspicion

Question B. I think Max was being honest.

Disagree	1	2	3	4	5	6	7	Agree

Question C. I question Max s honesty about actually selling those units to American Assembly.

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Question D. I know Max lied about his sale at American Assembly.

Uncertain	1	2	3	4	5	6	7	Certain

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Weak suspicion	1	2	3	4	5	6	7	Strong suspicion

Question D. I know Max lied about his sale at American Assembly.

Uncertain	1	2	3	4	5	6	7	Certain

Question E. I am positive Max lied about making that sale.

Uncertain	1	2	3	4	5	6	7	Certain

Question F. Without a doubt, Max was truthful.

Uncertain	1	2	3	4	5	6	7	Certain

APPENDIX B

COMPLETE NARRATIVES AND QUESTIONNNAIRES FOR STUDY 2

Below is a story about a global company called Ropar, Inc. Based on the information provided, your task is to determine if Max - a job candidate for a sales position at Ropar - had lied to the following question (specified below) during his interview.

Ropar is a mid-size, multi-billion dollar company that specializes in computer chips. When interviewing for sales positions, it is common for Ropar interviewers to ask candidates general questions, such as give me an example of how you build credibility with people you don t know very well and tell me how you have persuaded clients to buy products/services from you .

During an interview with a candidate named Max, the interviewer asked Max to provide an example of how he builds credibility with people he doesn t know very well , to which Max replied:

> I ve worked in sales now for seven years and so it s not hard for me to establish credibility with customers in fact, it s one of the things I do best. For instance, last month when I met with American Assembly [a large manufacturing company], the first thing I did was ask the client some questions around their current situation and then we talked a bit about how my company s services would be a perfect solution to their problem. It didn t take long for the client to see how much I understood their problem, my company s products, and how my solution made a lot of sense given their situation. I was only there for two hours and sold four high-speed telephony units for $180,000.

(Paragraph 1) The fact that Max had seven years of experience was impressive. However, for some reason the interviewer had a gut feeling that something was wrong with his answer after all, one telephony unit costs around $45,000, and rarely do people spend $180,000 after only two hours worth of discussion, especially without considering any other competitor bids.

(Paragraph 2) After doing some fact checking on Max s background, the interviewer realized that Max indeed had seven years of sales experience, at one of the most prestigious IT companies in the country nonetheless. However, after having an off-the-record conversation with one of his friends employed at American Assembly, the interviewer found out that American Assembly had recently purchased some telephony units but it wasn t Max who sold them the units it was a woman named Jackie.

(Paragraph 3) To get a fuller perspective of Max, the interviewer decided to check Max s references. During a conversation with Max s former boss, the interviewer found out that Max was desperate to get a new job since he was fired from his job just last week. However, due to privacy issues, the former employer couldn t speak as to why Max was fired.

To what extent do you agree with the following statements.[Ω]

Question A. I suspect Max lied about his sale of four telephony units to American Assembly.

Weak suspicion	1	2	3	4	5	6	7	Strong suspicion

Question B. I think Max was being honest.

Disagree	1	2	3	4	5	6	7	Agree

Question C. I question Max s honesty about actually selling those units to American Assembly.

Weak suspicion	1	2	3	4	5	6	7	Strong suspicion

Question D. I know Max lied about his sale at American Assembly.

Uncertain	1	2	3	4	5	6	7	Certain

Question E. I am positive Max lied about making that sale.

Uncertain	1	2	3	4	5	6	7	Certain

Question F. Without a doubt, Max was truthful.

Uncertain	1	2	3	4	5	6	7	Certain

Question G. Paragraph 1 was an important piece of information I used in deciding whether or not this person was deceptive.

Unimportant	1	2	3	4	5	6	7	Very Important

Question H. Paragraph 2 was an important piece of information I used in deciding whether or not this person was deceptive.

Unimportant	1	2	3	4	5	6	7	Very Important

Question I. Paragraph 3 was an important piece of information I used in deciding whether or not this person was deceptive.

Unimportant	1	2	3	4	5	6	7	Very Important

Question J. Not to exceed a sum total of one-hundred percent,
What percent of your decision was influenced by the information in paragraph 1? _____%
What percent of your decision was influenced by the information in paragraph 2? _____%
What percent of your decision was influenced by the information in paragraph 3? _____%

[Ω] Suspicion

Below is a story about a global company called Ropar, Inc. Based on the information provided, your task is to determine if Max - a job candidate for a sales position at Ropar - had lied to the following question (specified below) during his interview.

Ropar is a mid-size, multi-billion dollar company that specializes in computer chips. When interviewing for sales positions, it is common for Ropar interviewers to ask candidates general questions, such as "give me an example of how you build credibility with people you don't know very well" and "tell me how you have persuaded clients to buy products/services from you".

During an interview with a candidate named Max, the interviewer asked Max to provide an example of how he builds credibility with people he doesn't know very well, to which Max replied:

> I've worked in sales now for seven years and so it's not hard for me to establish credibility with customers – in fact, it's one of the things I do best. For instance, last month when I met with American Assembly [a large manufacturing company], the first thing I did was ask the client some questions around their current situation and then we talked a bit about how my company's services would be a perfect solution to their problem. It didn't take long for the client to see how much I understood their problem, my company's products, and how my solution made a lot of sense given their situation. I was only there for two hours and sold four high-speed telephony units for $180,000.

(Paragraph 1) The fact that Max had seven years of experience was impressive. Also, the fact that he could build enough credibility to sell $180,000 worth of products in less than two hours was also commendable.

(Paragraph 2) After doing some fact checking on Max's background, the interviewer realized that Max indeed had seven years of sales experience, at one of the most prestigious IT companies in the country nonetheless. However, after having an off-the-record conversation with one of his friends employed at American Assembly, the interviewer found out that American Assembly had recently purchased some telephony units but it wasn't Max who sold them the units – it was a woman named Jackie.

(Paragraph 3) To get a fuller perspective of Max, the interviewer decided to check Max's references. During a conversation with Max's former boss, the interviewer found out that Max was desperate to get a new job since he was fired from his job just last week. However, due to privacy issues, the former employer couldn't speak as to why Max was fired.

To what extent do you agree with the following statements.[Ω]

Question A. I suspect Max lied about his sale of four telephony units to American Assembly.

Weak suspicion	1	2	3	4	5	6	7	Strong suspicion

Question B. I think Max was being honest.

Disagree	1	2	3	4	5	6	7	Agree

Question C. I question Max s honesty about actually selling those units to American Assembly.

Weak suspicion	1	2	3	4	5	6	7	Strong suspicion

Question D. I know Max lied about his sale at American Assembly.

Uncertain	1	2	3	4	5	6	7	Certain

Question E. I am positive Max lied about making that sale.

Uncertain	1	2	3	4	5	6	7	Certain

Question F. Without a doubt, Max was truthful.

Uncertain	1	2	3	4	5	6	7	Certain

Question G. Paragraph 1 was an important piece of information I used in deciding whether or not this person was deceptive.

Unimportant	1	2	3	4	5	6	7	Very Important

Question H. Paragraph 2 was an important piece of information I used in deciding whether or not this person was deceptive.

Unimportant	1	2	3	4	5	6	7	Very Important

Question I. Paragraph 3 was an important piece of information I used in deciding whether or not this person was deceptive.

Unimportant	1	2	3	4	5	6	7	Very Important

Question J. Not to exceed a sum total of one-hundred percent.

What percent of your decision was influenced by the information in paragraph 1? _____%
What percent of your decision was influenced by the information in paragraph 2? _____%
What percent of your decision was influenced by the information in paragraph 3? _____%

[Ω] No Suspicion

APPENDIX C

COMPLETE NARRATIVES AND QUESTIONNAIRES FOR STUDY 3

(Experimental Group) **Instructions**

You will read about a global company called Ropar, Inc. Below you will find some basic information about the company. There are many different scenarios for this study however, you are asked to read only one of these scenarios. It is important to note that in some scenarios deception has occurred, whereas in other scenarios deception has NOT occurred.

Based on the information provided in this study, your task is to decide if Max - a job candidate for a sales position at Ropar - had lied to the following question (specified below) during his interview. There are 6 possible types of information you could receive. Simply choose the information you d like to receive to help you make this decision, make a note of it on the answer sheet, and then open the corresponding folder (labeled a-f). **Please read all 6 options before choosing**.

Note that you do not need to read the information available in all 6 folders in order to make a decision: you only need to select the most relevant information necessary to help you make a decision regarding Max s guilt or innocence.

You should select the make a decision option once you ve gathered enough information to make an informed decision. Once you make your decision, you will have completed the study. (PLEASE DO NOT OPEN ANY ADDITIONAL FOLDERS AT THIS POINT). Hand in your materials to the experimenter and get your credit slip. Thanks.

Background Information

Ropar is a mid-size, multi-billion dollar company that specializes in computer chips. When interviewing for sales positions, it is common for Ropar interviewers to ask candidates general questions, such as "give me an example of how you build credibility with people you don't know very well" and "tell me how you have persuaded clients to buy products/services from you".

During an interview with a candidate named Max, the interviewer asked Max to provide an example of how he builds credibility with people he doesn't know very well, to which Max replied:

> I've worked in sales now for seven years and so it's not hard for me to establish credibility with customers – in fact, it's one of the things I do best. For instance, last month when I met with American Assembly [a large manufacturing company], the first thing I did was ask the client some questions around their current situation and then we talked a bit about how my company's services would be a perfect solution to their problem. It didn't take long for the client to see how much I understood their problem, my company's products, and how my solution made a lot of sense given their situation. I was only there for two hours and sold four high-speed telephony units for $180,000.

You have to decide what type of information you'd like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max's guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max's lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

Gather additional general information about the company

Ropar had a fiscally good year. They ve continued to grow in terms of revenue and profit. They ve added 1079 new employees, and established some key business partnerships. Specifically,

- Revenue: $2,345,553, 678 (17% increase from last year)
- Profit: $803,665, 909 (20% increase from last year)
- Number of Employees: 2204 (an increase of 1079 employees)
- Key Partnerships:
    - Astrop: Astrop is a major food producer. They establish standards for the chemical properties of food products. Ropar uses this information to program their nano-bots on when to deploy and restore the product s chemical balance.
    - Rolatio: Rolatio is a major marketing firm. They have a proven track record of increasing corporate sales by as much as 200% in one-year. Obviously this partnership will help put Ropar on the map, in terms of who s who in RFID technology.
    - Sputnik: Sputnik also creates RFID chips. However their chips work slightly different: their chips monitor the packaging of products. When the outer package is dented or damaged, Sputnik s RFID chips deploy nano-bots to repair the product s packaging. This technology could be combined with Ropar s technology to create RFID chips that monitor both the contents and packaging of various products.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

Make a decision **about the guilt/innocence of the accused.**

Question A. I know Max lied about his sale at American Assembly.

Uncertain 1 2 3 4 5 6 7 Certain

Question B. I am positive Max lied about making that sale.

Uncertain 1 2 3 4 5 6 7 Certain

Question C. Without a doubt, Max was truthful.

Uncertain 1 2 3 4 5 6 7 Certain

Make an inquiry to determine if there is any reason to *suspect* any wrongdoing

The fact that Max had seven years of experience was impressive. However, for some reason the interviewer had a gut feeling that something was wrong with his answer after all, one telephony unit costs around $45,000, and rarely do people spend $180,000 after only two hours worth of discussion, especially without considering any other competitor bids.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

***Examine the lifestyle* of the accused.**

Max DeForester

Max lives a rather fast-paced, lavish lifestyle but, of course, his salary allows him to be extravagant: weekend getaways to Italy or the Virgin islands is fairly common; he wears only designer clothes, like Armani and Hugo Boss; and he has been married four times and is currently in the process of divorcing his fourth wife, a former administrative assistant.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

Search for evidence proving whether any wrongdoing had occurred

After doing some fact checking on Max s background, the interviewer realized that Max indeed had seven years of sales experience, at one of the most prestigious IT companies in the country nonetheless. However, after having an off-the-record conversation with one of his friends employed at American Assembly, the interviewer found out that American Assembly had recently purchased some telephony units but it wasn t Max who sold them the units it was a woman named Jackie.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

Inquire about a possible motive for the deception.

To get a fuller perspective of Max, the interviewer decided to check Max s references. During a conversation with Max s current boss, the interviewer realized that Max was happy with his current company and that he was only interviewing at Ropar because it would be a unique career move for him. That is, although Max would consider accepting a job at Ropar (if one was offered), there was no guarantee he d ultimately accept it since he s quite happy with his current job.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

Answer Sheet

After reading the introduction and instructions, please write in the spaces below which types of information you want to receive. Specifically, please list the letter (a-f) and the key phrase (the phrases next to the corresponding letters) in the appropriate space and then read the information that corresponds with that step. (Please note that you DO NOT need to use all six spaces -- only use the spaces you need until you have enough information to make a decision.) [1]

Step 1: _____

Step 2: _____

Step 3: _____

Step 4: _____

Step 5: _____

Step 6: _____

Make a decision: please state the extent to which you agree with the following statements:

Question A. I know Max lied about his sale at American Assembly.

Uncertain	1	2	3	4	5	6	7	Certain

Question B. I am positive Max lied about making that sale.

Uncertain	1	2	3	4	5	6	7	Certain

Question C. Without a doubt, Max was truthful.

Uncertain	1	2	3	4	5	6	7	Certain

[1] Internal Use Only: Participant # _____ ; Condition _____

(Control Group) **Instructions**

You will read about a global company called Ropar, Inc. Below you will find some basic information about the company. There are many different scenarios for this study however, you are asked to read only one of these scenarios. It is important to note that in some scenarios deception has occurred, whereas in other scenarios deception has NOT occurred.

Based on the information provided in this study, your task is to decide if Max - a job candidate for a sales position at Ropar - had lied to the following question (specified below) during his interview. There are 6 possible types of information you could receive. Simply choose the information you d like to receive to help you make this decision, make a note of it on the answer sheet, and then open the corresponding folder (labeled a-f). **Please read all 6 options before choosing**.

Note that you do not need to read the information available in all 6 folders in order to make a decision: you only need to select the most relevant information necessary to help you make a decision regarding Max s guilt or innocence.

You should select the make a decision option once you ve gathered enough information to make an informed decision. Once you make your decision, you will have completed the study. (PLEASE DO NOT OPEN ANY ADDITIONAL FOLDERS AT THIS POINT). Hand in your materials to the experimenter and get your credit slip. Thanks.

Background Information

Ropar is a mid-size, multi-billion dollar company that specializes in computer chips. When interviewing for sales positions, it is common for Ropar interviewers to ask candidates general questions, such as give me an example of how you build credibility with people you don t know very well and tell me how you have persuaded clients to buy products/services from you .

During an interview with a candidate named Max, the interviewer asked Max to provide an example of how he builds credibility with people he doesn t know very well , to which Max replied:

> I ve worked in sales now for seven years and so it s not hard for me to establish credibility with customers in fact, it s one of the things I do best. For instance, last month when I met with American Assembly [a large manufacturing company], the first thing I did was ask the client some questions around their current situation and then we talked a bit about how my company s services would be a perfect solution to their problem. It didn t take long for the client to see how much I understood their problem, my company s products, and how my solution made a lot of sense given their situation. I was only there for two hours and sold four high-speed telephony units for $180,000.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

Gather additional general information about the company

Ropar had a fiscally good year. They ve continued to grow in terms of revenue and profit. They ve added 1079 new employees, and established some key business partnerships. Specifically,

- Revenue: $2,345,553, 678 (17% increase from last year)
- Profit: $803,665, 909 (20% increase from last year)
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- Key Partnerships:
    - Astrop: Astrop is a major food producer. They establish standards for the chemical properties of food products. Ropar uses this information to program their nano-bots on when to deploy and restore the product s chemical balance.
    - Rolatio: Rolatio is a major marketing firm. They have a proven track record of increasing corporate sales by as much as 200% in one-year. Obviously this partnership will help put Ropar on the map, in terms of who s who in RFID technology.
    - Sputnik: Sputnik also creates RFID chips. However their chips work slightly different: their chips monitor the packaging of products. When the outer package is dented or damaged, Sputnik s RFID chips deploy nano-bots to repair the product s packaging. This technology could be combined with Ropar s technology to create RFID chips that monitor both the contents and packaging of various products.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

Make a decision **about the guilt/innocence of the accused.**

Question A. I know Max lied about his sale at American Assembly.

Uncertain	1	2	3	4	5	6	7	Certain

Question B. I am positive Max lied about making that sale.

Uncertain	1	2	3	4	5	6	7	Certain

Question C. Without a doubt, Max was truthful.

Uncertain	1	2	3	4	5	6	7	Certain

Make an inquiry to determine if there is any reason to suspect any wrongdoing.

The fact that Max had seven years of experience was impressive. Also, the fact that he could build enough credibility to sell $180,000 worth of products in less than two hours was also commendable.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

***Examine the lifestyle* of the accused.**

Max DeForester

Max lives a rather fast-paced, lavish lifestyle but, of course, his salary allows him to be extravagant: weekend getaways to Italy or the Virgin islands is fairly common; he wears only designer clothes, like Armani and Hugo Boss; and he has been married four times and is currently in the process of divorcing his fourth wife, a former administrative assistant.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

Search for evidence proving whether any wrongdoing had occurred

After doing some fact checking on Max s background, the interviewer realized that Max indeed had seven years of sales experience, at one of the most prestigious IT companies in the country nonetheless. After having an off-the-record conversation with one of his friends employed at American Assembly, the interviewer found out that American Assembly had recently purchased some telephony units but he wasn t sure of the name of the person who sold the units to American Assembly.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

Inquire about a possible motive for the deception.

To get a fuller perspective of Max, the interviewer decided to check Max s references. During a conversation with Max s current boss, the interviewer realized that Max was happy with his current company and that he was only interviewing at Ropar because it would be a unique career move for him. That is, although Max would consider accepting a job at Ropar (if one was offered), there was no guarantee he d ultimately accept it since he s quite happy with his current job.

You have to decide what type of information you d like to receive next?

a. Gather additional general information about the company.
b. *Make a decision* about Max s guilt/innocence.
c. Make an inquiry to determine if there is any reason to suspect any wrongdoing.
d. Examine Max s lifestyle.
e. Search for evidence proving whether any wrongdoing had occurred.
f. Inquire about a possible motive for the deception.

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